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# WYOMING ORNITHOLOGY

A HISTORY & BIBLIOGRAPHY

with

SPECIES & WYOMING AREA INDEXES

by

Jane Logan Dorn

with

ADDITIONAL REFERENCES FROM STATES  
ADJACENT TO WYOMING  
by

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#### SAGE THRASHER

"On the arid plains of the central table-land, betwixt the northern sources of the Platte and the Colorado of the West, in the month of June, we frequently heard the cheering song of this delightful species. . . ." (Nuttall 1840)

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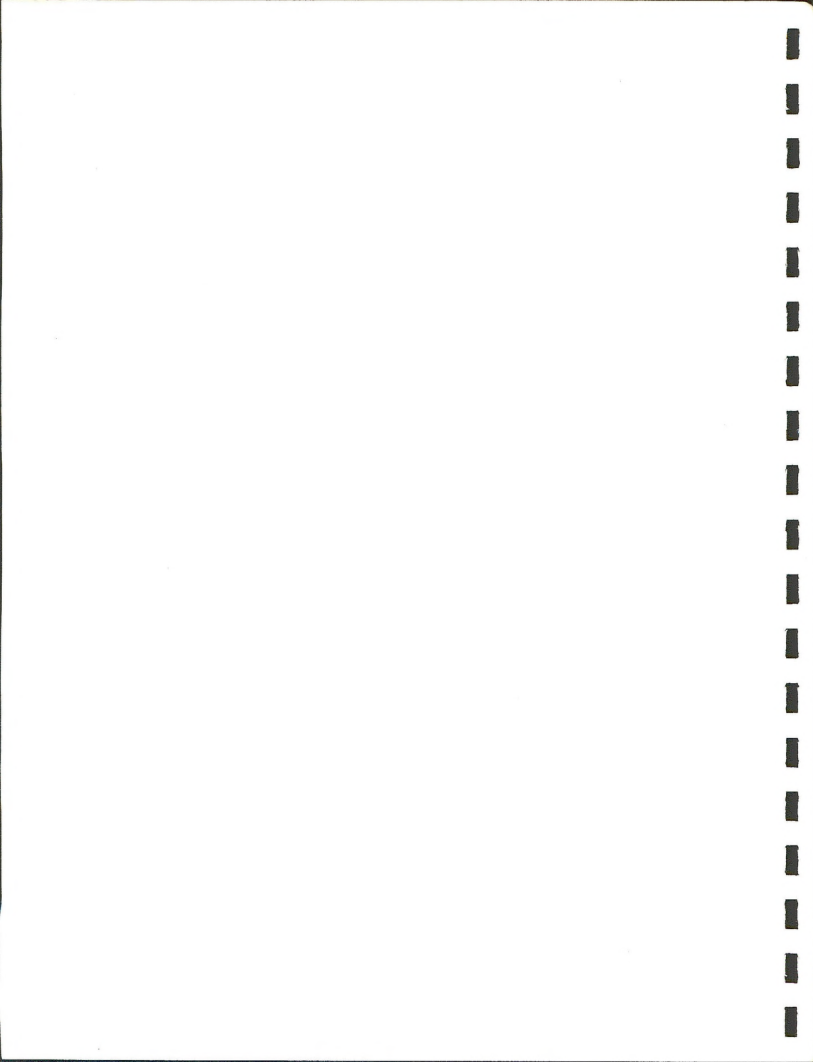


This bibliography was compiled under contract to the Bureau of Land Management (Contract No. YA-512-CT8-126). The intent was to accumulate information on birds in Wyoming, with special emphasis on those publications containing density information on which analysis of wildlife losses due to mining could be based. At the time we began, we were aware that Ms. Jane Dorn had exhaustively summarized most of the Wyoming bird literature up to 1974, and the history of ornithology in Wyoming. That information is contained herein.

Since a good deal of the Wyoming literature did not deal with densities, we surveyed bird research in states adjacent to Wyoming as well as general literature containing pertinent density or habitat affinity information.

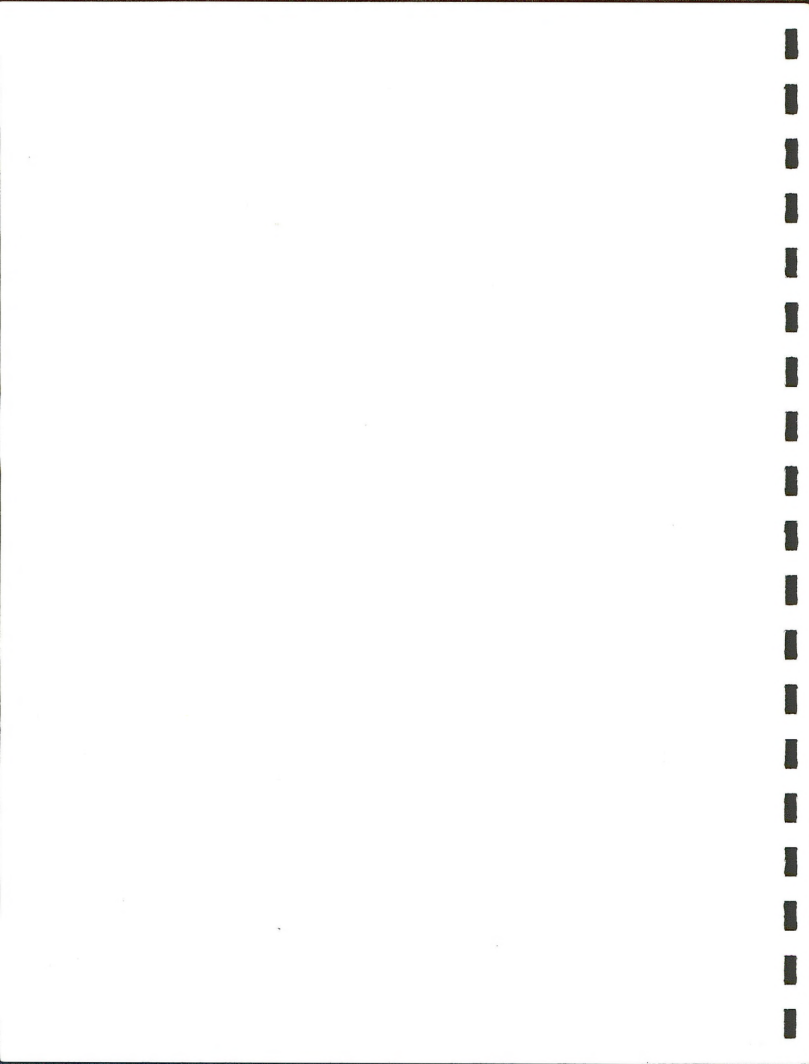
The Wyoming Game and Fish Department portion of this bibliography is not intended to be exhaustive, since we concentrated on articles relating to density or habitat affinity. We have undoubtedly missed works that maybe pertinent. However, this bibliography and the summaries of important articles comprise the first detailed compilation of published bird information for Wyoming. Density information is summarized by species in Table I.

We thank Jane Dorn, Reg Rothwell, Rick Straw, Greg Skutches, and Craig Sax for their library research efforts, and Merlin Hehnke, whose idea for the bibliography stimulated publication of Ms. Dorn's work and the search for density information on bird species native to Wyoming.



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## INTRODUCTION

The aim of this account is to provide a single source of information that summarizes the discovery and description of Wyoming's bird life. It may also serve as an initial reference for those who wish to compare the present distribution and abundance of birds with their historical status, since most of the 19th century collections were made before white men had appreciably altered the state's habitats.

This work is not exhaustive. Some references to Wyoming bird life, particularly in private journals, have undoubtedly been overlooked. Many people have studied birds in the state since the beginning of the 20th century. Only the most notable work is discussed for this period.

Most of the discovery and description of the state's bird life was an integral part of the exploration of the West. Frontier commerce or geographical exploration, not scientific collection, was usually the primary purpose of an expedition. Naturalists collected birds when and where they could. This fact should be considered when comparing the present status of birds with records of their historical distribution and abundance.

Most of the official reports of the government exploring expeditions were published as documents of the United States Senate or House of Representatives. Sometimes both a Senate and a House version were issued. Many of the more popular reports were also published for public distribution without a House or Senate document number. The titles, dates of publication and



pagination of different versions may vary. The reader who is unable to locate the cited version should consult the Checklist of United States Public Documents 1789-1909 to check for other versions.

Geographic place names used in this account are, for the most part, the modern names. To anyone consulting the original references, a special note of caution is necessary about the name "Black Hills." This name was applied both to the Laramie Range in southeastern Wyoming and to the present Black Hills in northeast Wyoming and western South Dakota.

The avian nomenclature follows the A. O. U. Check-list (1957, 1973a, and 1973b).

Staffs of the libraries and museums where I have worked deserve special thanks: the University of Wyoming; the Museum of Comparative Zoology, Harvard University; the New England Depository Library, Cambridge, Massachusetts; and Montana State University, Bozeman. The National Museum of Canada Library and the Department of Agriculture Library, both in Ottawa, Ontario, also provided some rare references. The collection of birds in the University of Wyoming Museum of Zoology was a source of information on resident ornithologists. I also examined a small number of the Wyoming specimens in the United States National Museum, Washington, D. C.



## PREFACE

A bibliography needs little introduction. I have attempted to make this one complete, but nothing becomes more obvious to a bibliographer than the impossibility of ever completing the task or achieving 100 percent accuracy. I claim full responsibility for all errors and omissions.

Bibliographic entries are arranged alphabetically by the last name of the sole or senior author. References to palaeornithology are listed separately after the main bibliography. Two papers mentioning bird remains found at archaeological sites are included with the fossil literature. Many references are annotated, particularly the more ambiguous or imprecise titles. In cases where many species of birds are mentioned in an article, only the most fully discussed or unusual ones are noted in the annotation. Species and area indexes are at the end of the bibliography. These should eliminate much of the tedious reference-by-reference reading necessary with many bibliographies.

Three major treatments of Wyoming birds have been published: Knight 1902, Grave and Walker 1913, and McCreary 1939. Two important works dealing with parts of the state are Skinner's (1925) account of the birds of Yellowstone National Park and Pettingill and Whitney's (1965) book on the birds of the Black Hills of South Dakota and Wyoming. The seasonal reports and Christmas bird counts in Audubon Field Notes, and its successor American Birds, are a good source of information on migrating, nesting, and wintering birds in some parts of the state. Most of the references in this journal are listed under Cruickshank, M. B. Hickey, Kingery, Low, O. K. Scott, and Wilson and Norr.



1. Aiken, C. E.  
1873. A glimpse at Colorado and its birds. Amer. Nat.  
7: 13-16. (mentions a few Wyo. species)
2. Aitken, A. D., Jr.  
1935. A Golden Eagle's nest. Bird-Lore 37: 105-108.  
(near Salt Creek Oil Field, 2 yrs observations)
3. Alcorn, W. B.  
1949. A Trumpeter Swan family. Yellowstone Nature  
Notes 23(5): 53-55.
4. Aldrich, J. W.  
1935. Bird notes from the Bighorn Mountain region of  
Wyoming. Wilson Bull. 47: 57-59.
5. 1939. Geographic variation of the Veery. Auk 56: 338-  
340. (cites specimens from Wyo.)
6. 1943. A new Fox Sparrow from the northwestern United  
States. Proc. Biol. Soc. Wash. 56: 163-166.  
(cites specimens from Wyo. of a proposed new  
subspecies)
7. 1944. Notes on the races of the White-breasted Nuthatch.  
Auk 61: 592-604. (ranges of subspecies in Wyo.)
8. 1946. The United States races of the Bob-white. Auk  
63: 493-508. (map, discussion of ranges of races)
9. 1946. New subspecies of birds from western North  
America. Proc. Biol. Soc. Wash. 59: 129-136.  
(cites specimens from Wyo. of a proposed new  
subspecies of Catbird)

10. Aldrich, J. W.
  1947. Preliminary map showing the breeding distribution of the Lark Sparrow. Audubon Field Notes 1: 133.
11. 1948. Distribution of North American birds: the breeding distribution of the Dickcissel. Audubon Field Notes 2: 12. (map shows Dickcissel breeding in eastern Wyo.)
12. 1948. Preliminary map showing breeding distribution of the Poor-will. Audubon Field Notes 2: 191.
13. 1951. A review of the races of the Traill's Flycatcher. Wilson Bull. 63: 192-197. (E. traillii campestris breeding in Wyo.)
14. 1963. Geographic orientation of American Tetraonidae. J. Wildl. Mgmt. 27: 529-545. (distribution of grouse species and subspecies)
15. 1968. Population characteristics and nomenclature of the Hermit Thrush. Proc. U. S. Natl. Mus. 124: 1-33. (Wyo. specimens examined)
16. Aldrich, J. W. and A. J. Duvall.
  1955. Distribution of American gallinaceous game birds. U. S. Dept. Int., Fish & Wildl. Serv. Circular 34. 23pp.
17. 1958. Distribution and migration of races of the Mourning Dove. Condor 60: 108-128. (Wyo. specimens examined)



18. Aldrich, J. W. and H. Friedmann.  
1943. A revision of the Ruffed Grouse. Condor 45: 85-103.  
(proposed new subspecies occurs in Wyo.)
19. Alleman, G. C.  
1956. David and Goliath. Yellowstone Nature Notes  
30(2): 16-17. (Canada Goose-Red-winged Blackbird  
interactions)
20. 1956. Problems of survival. Yellowstone Nature Notes  
30(2): 20-21. (Raven, Red-tailed Hawk, eagle  
compete for food)
21. Allen, A. A. (chairman).  
1944. Report of the A. O. U. committee on bird protection  
for 1943. Auk 61: 622-635. (Trumpeter Swan  
population in Yellowstone)
22. Allen, J. A.  
1871. Notes of an ornithological reconnoissance of  
portions of Kansas, Colorado, Wyoming, and Utah.  
Bull. Mus. Comp. Zool. (Harvard Univ.) 3:113-184.  
(lists 41 species of birds observed at Cheyenne,  
additional records for southern Wyo.)
23. 1903. Knight's 'The Birds of Wyoming.' Auk 20: 82-83.  
(review of Knight, 1902)
24. Allen, R. P.  
1952. The Whooping Crane. National Audubon Society  
Research Report No. 3, New York. xxvii + 246 pp.  
(sightings of Whooping Crane in Wyo.)

25. Allred, W. J.  
1942. Predation and the Sage Grouse. Wyo. Wild Life 7(1): 3-4.
26. 1946. Wyoming Sage Grouse survey. Wyo. Wild Life 10(7): 28-31.
27. 1949. Sage Grouse in '49. Wyo. Wild Life 13(10): 2.
28. 1950. Birds and poison. Wyo. Wild Life 14(4): 2.  
(deleterious effects of grasshopper poison on birds)
29. American Ornithologists' Union.  
1957. Check-list of North American birds. 5th ed.  
Lord Baltimore Press, Inc., Baltimore.
30. Anderson, D. R. and C. J. Henny.  
1972. Population ecology of the Mallard: 1. Review of previous studies and distribution and migration from breeding areas. U. S. Dept. Int., Bur. Sport Fish. & Wildl., Resource Publ. No. 105. vi + 166 pp.  
(continued in Pospahala, et al., 1974)
31. Anderson, D. W. and J. J. Hickey.  
1970. Eggshell changes in certain North American birds. Proc. 15th Intern. Ornith. Congr. 15: 514-540.  
(egg-shell weights of Red-tailed Hawk, Prairie Falcon and Common Crow from Wyo.)
32. Anderson, F. H.  
1947. Birds of the Snake River area. Yellowstone Nature Notes 21(3): 34-35.
33. 1948. Waterfowl in Yellowstone Park. Yellowstone Nature Notes 22(3): 30.

34. Anderson, F. H.  
1948. Leaves from our diaries. Yellowstone Nature Notes 22(6): 72. (1st record of Snowy Egret in park)
35. 1949. Brewster's Snowy Egret. Yellowstone Nature Notes 23(5): 55.
36. Anderson, F. and L. Coleman.  
1936. Winter bird residents at Lake Yellowstone. Yellowstone Nature Notes 13(5-6): 25-28.
37. Anonymous.  
1882. Wilson's Snipe winters in Wyoming. Forest and Stream 18: 226. (Como, Albany Co.)
38. 1885. Through Two-Ocean Pass. III--A camp on Yellowstone Lake. Forest and Stream 24: 42. (mentions shooting White Pelican)
39. 1885. Through Two-Ocean Pass. XII--Up Pacific Creek. Forest and Stream 24: 202-203. (behavior of Dipper, mentions birds seen along Pacific Creek)
40. 1928. Pathfinder reservation reestablished as Pathfinder bird-refuge. Bird-Lore 30: 304. (established 1909, abolished 1922)
41. 1931. Fuller and Bole on Wyoming birds. Auk 48: 146-147. (review of Fuller and Bole, 1930)
42. 1934. Thirty-fourth Christmas census. Bird Lore 36: 60. (Salt Creek Oil Field, Wapiti in Park Co.)
43. 1935. Thirty-fifth Christmas census. Bird Lore 37: 78. (Salt Creek Oil Field)

44. Anonymous.  
1936. Thirty-sixth Christmas bird census. Bird Lore 38: 79. (Salt Creek Oil Field, Torrington)
45. 1936. Sage chickens plentiful. Wyo. Wild Life 1(4): no page nos.
46. 1936. Whistling Swan a rarity. Wyo. Wild Life 1(4): no page nos.
47. 1936. White Pelicans appear. Wyo. Wild Life 1(6): no page nos. (22 in Jackson Hole)
48. 1936. Open season on sage chicken. Wyo. Wild Life 1(7): no page nos.
49. 1936. Robin sends out S. O. S. Wyo. Wild Life 1(7): no page nos. (snake attacks Robin nest)
50. 1936. Sage chicken season. Wyo. Wild Life 1(8): no page nos.
51. 1936. Wild Turkey doing fine. Wyo. Wild Life 1(8): no page nos. (Laramie Peak population)
52. 1936. State bird game refuge. Wyo. Wild Life 1(10): no page nos.
53. 1936. Pheasant birds are increasing. Wyo. Wild Life 1(11): no page nos.
54. 1937. Gamble [sic] Quail doing well. Wyo. Wild Life 2(4): no page nos. (on Little Popo Agie River)
55. 1937. Breeding of sage hens. Wyo. Wild Life 2(5): no page nos. (When do hens come to strutting ground?)

## 56. Anonymous.

1937. Has anyone seen Prairie Chickens? Wyo. Wild Life 2(5): no page nos.
57. 1937. Sage hen season closed. Wyo. Wild Life 2(6): no page nos.
58. 1937. Sage chicken refuges. Wyo. Wild Life 2(7): no page nos. (possibility of setting aside some nesting areas as permanent sanctuaries)
59. 1937. The White-throated Swift. Wyo. Wild Life 2(7): no page nos. (nesting at Brimmer Point on Guernsey Lake)
60. 1937. Sage chickens doing fine. Wyo. Wild Life 2(8): no page nos. (loss of young in some parts of state due to late storms)
61. 1937. Trumpeter Swans coming back. Wyo. Wild Life 2(9): no page nos.
62. 1937. Asian partridges for Cody area. Wyo. Wild Life 2(10): no page nos. (W. S. Owens' plans to release Chukars)
63. 1938. Thirty-eighth Christmas bird census. Bird Lore 40: 65. (Douglas, Laramie, Torrington)
64. 1938. Sage chickens scarce in Natrona. Wyo. Wild Life 3(6): no page nos.
65. 1938. Double-crested Cormorants. Wyo. Wild Life 3(6): no page nos. (nesting at Shoshone Reservoir)

## 66. Anonymous.

1938. Flash! Bird without gizzard? Wyo. Wild Life 3(8): no page nos. (differences between gizzard of Sage Grouse and domestic chicken)
67. 1938. Checking sage chicken malady. Wyo. Wild Life 3(8): no page nos. (possible case of blackhead)
68. 1938. Chukar Partridges in Natrona County. Wyo. Wild Life 3(12): no page nos.
69. 1938. Magpie trapping brings results. Wyo. Wild Life 3(12): no page nos.
70. 1939. Bohemian Waxwings. Wyo. Wild Life 4(2-3): 13.
71. 1939. Trumpeter Swan leaves biological refuge home. Wyo. Wild Life 4(2-3): 14. (4 young swans released on Flat Creek, Jackson Hole)
72. 1939. Bird collection given U. W. Wyo. Wild Life 4(4): 2. (E. A. Lockwood wills collection of birds to Univ. Wyo.: 100 mounted, 600 study skins)
73. 1939. Spring bird migrations. Wyo. Wild Life 4(4): 15.
74. 1939. Identify the hawk before you shoot. Wyo. Wild Life 4(7): 6.
75. 1939. Cormorant nests. Wyo. Wild Life 4(11): 3. (photo of nests on Shoshone Reservoir)
76. 1940. Fortieth Christmas bird count. Bird Lore 42: 124-125. (Casper, Douglas, Grand Teton National Park, Lander, Torrington, Yellowstone)
77. 1940. The desert Horned Lark. Wyo. Wild Life 5(1): 11.

## 78. Anonymous.

1940. Trumpeter Swan makes great comeback in U. S. Wyo. Wild Life 5(2): 7.
79. 1940. Chukar Partridge. Wyo. Wild Life 5(3): 20.  
(brief history of introduction into Wyo.)
80. 1940. The strutting Sage Grouse. Wyo. Wild Life 5(6): 10-11.
81. 1940. Yellowstone National Park has 70 Trumpeter Swans. Wyo. Wild Life 5(7): 16.
82. 1940. Bird-hunting rules are liberalized. Wyo. Wild Life 5(10): 1-3.
83. 1940. The Redhead. Wyo. Wild Life 5(11): 16.
84. 1941. Southern White-tailed Ptarmigan. Wyo. Wild Life 6(2): 8, 16.
85. 1941. The Ring-billed Gull. Wyo. Wild Life 6(3): 8, 22.
86. 1941. Golden Eagle's nest. Wyo. Wild Life 6(3): 21.  
(pellets collected beneath the nest were analyzed)
87. 1941. The California Quail. Wyo. Wild Life 6(5): 6, 18-19.
88. 1941. Hungarian or European Partridge. Wyo. Wild Life 6(6): 6, 22-23.
89. 1941. [Wyoming Sage Grouse survey and transplanting program]. Wyo. Wild Life 6(6): 19-20.
90. 1941. The Ring-necked Pheasant. Wyo. Wild Life 6(8): 6, 13.
91. 1941. The Golden Eagle. Wyo. Wild Life 6(9): 6, 17.
92. 1941. The Sage Grouse. Wyo. Wild Life 6(11): 6, 18-19.

93. Anonymous.  
1941. The gray Ruffed Grouse. Wyo. Wild Life 6(12):  
4, 14, 17.
94. 1942. Double-crested Cormorant. Wyo. Wild Life  
7(1): 6, 24.
95. 1942. The Trumpeter Swan. Wyo. Wild Life 7(2): 8, 17.  
(population 1934-1941)
96. 1942. Transplanting the Sage Grouse. Wyo. Wild Life  
7(2): 15-16.
97. 1942. Cormorants. Wyo. Wild Life 7(5): 13. (photo  
of nests on Ocean Lake, Fremont Co.)
98. 1942. Meadowlark official bird of seven states. Wyo.  
Wild Life 7(6): 4-5.
99. 1943. The Whistling Swan. Wyo. Wild Life 8(2): 6-7.
100. 1943. [Strutting Sage Grouse]. Wyo. Wild Life 8(4): 4.  
(photo with information on Wyo. population in  
caption)
101. 1943. Wyoming ducks. Wyo. Wild Life 8(4): 7-10.  
(Mallard)
102. 1943. Wyoming ducks. Wyo. Wild Life 8(5): 7, 18.  
(Gadwall)
103. 1943. The wild Turkey. Wyo. Wild Life 8(6): 6, 19-20.  
(history of Turkey introductions in Wyo.)
104. 1943. Wyoming ducks. Wyo. Wild Life 8(6): 7, 18.  
(Pintail)



105. Anonymous.  
1943. The Montana horned owl. Wyo. Wild Life 8(7):  
8, 20-22.
106. 1943. Wyoming ducks: the Shoveller, Spatula clypeata.  
Wyo. Wild Life 8(7): 9, 22-23.
107. 1943. Wyoming ducks: the Baldpate, Mareca americana.  
Wyo. Wild Life 8(8): 11, 17.
108. 1943. The Bittern, Botaurus lentiginosus. Wyo. Wild  
Life 8(9): 6-7, 19.
109. 1943. Wyoming ducks: the Wood Duck, Aix sponsa. Wyo.  
Wild Life 8(9): 15-16.
110. 1943. Brewster's Egret Egretta thula brewsteri. Wyo.  
Wild Life 8(10): 8-9. (Snowy Egret)
111. 1943. Wyoming ducks: the Black Duck, Anas rubripes.  
Wyo. Wild Life 8(10): 17, 20.
112. 1943. The Great Blue Heron Ardea herodias. Wyo. Wild  
Life 8(11): 12-14, 16.
113. 1943. Wyoming ducks: the Green-winged Teal, Nettion  
carolinense. Wyo. Wild Life 8(11): 17-18.
114. 1943. Wyoming ducks: the Blue-winged Teal, Querquedula  
discors. Wyo. Wild Life 8(12): 22-23.
115. 1944. The western Mourning Dove, Zenaidura macroura  
marginella. Wyo. Wild Life 9(1): 6-9.
116. 1944. Wyoming ducks: the Cinnamon Teal, Querquedula  
cyanoptera. Wyo. Wild Life 9(1): 13-15.

117. Anonymous.  
1944. The Nighthawk. Wyo. Wild Life 9(2): 10-12.
118. 1944. Wyoming ducks: Redhead, Nyroca americana. Wyo. Wild Life 9(2): 24-26.
119. 1944. Shore birds of Wyoming. Wyo. Wild Life 9(3): 6-9.
120. 1944. Wyoming ducks: the Ring-necked Duck, Nyroca collaris. Wyo. Wild Life 9(3): 20-21.
121. 1946. Trumpeter Swans at Yellowstone. News from the Bird-Banders 21(3): 29.
122. 1946. The Marbled Godwit. Wyo. Wild Life 10(1): 11-12.
123. 1946. Wyoming ducks. Wyo. Wild Life 10(1): 22-24.  
(Canvasback)
124. 1946. Wyoming ducks. Wyo. Wild Life 10(2): 24-25.  
(Greater Scaup)
125. 1946. Wyoming ducks. Wyo. Wild Life 10(3): 29-31.  
(Common Goldeneye)
126. 1946. Wyoming ducks. Wyo. Wild Life 10(4): 24-25.  
(Barrow's Goldeneye)
127. 1946. Wyoming ducks. Wyo. Wild Life 10(5): 24-26.  
(Bufflehead)
128. 1946. Wyoming ducks. Wyo. Wild Life 10(6): 34-35.  
(Lesser Scaup)
129. 1946. Wyoming ducks. Wyo. Wild Life 10(7): 26-27.  
(Oldsquaw)
130. 1946. Wyoming ducks. Wyo. Wild Life 10(9): 16-17.  
(Harlequin Duck)

131. Anonymous.  
1946. What about the pheasant? Wyo. Wild Life 10(10-11): 7-11.
132. 1946. Wyoming ducks. Wyo. Wild Life 10(10-11): 25-27.  
(White-winged Scoter)
133. 1947. Wyoming ducks. Wyo. Wild Life 11(1-2): 18-20.  
(Ruddy Duck)
134. 1947. Blackbird blackout. Wyo. Wild Life 11(6): 19.  
(use of high-pitched sound to drive blackbirds from grain plots at university farm)
135. 1947. No pullorum. Wyo. Wild Life 11(7): 7.  
(pheasants and Chukar Partridges at state bird farm free of pullorum disease)
136. 1947. How have the Turkeys fared? Wyo. Wild Life 11(10): 4-12, 39. (population increase since introduction in Laramie Range in 1935)
137. 1947. Game bird release. Wyo. Wild Life 11(10): 19.
138. 1947. Goshen pheasants. Wyo. Wild Life 11(11): 10.
139. 1948. The migrant wings turn north. Wyo. Wild Life 12(1-2): 4-11, 34-36. (Canada Geese in Goshen and Jackson holes)
140. 1948. A report on Wyoming Sage Grouse. Wyo. Wild Life 12(3): 14-19, 32-33. (includes information on predation)
141. 1949. Aid for pheasants. Wyo. Wild Life 13(4): 18.  
(propagation and release in Goshen Co.)

142. Anonymous.  
1949. Chukar introduction. Wyo. Wild Life 13(7): 36.
143. 1949. Wyoming's upland game birds. Wyo. Wild Life  
13(10): 9, 36-37.
144. 1950. Three rare Wyoming birds. Annals Wyo. 22(1): 95-96.  
(mounted specimens of Trumpeter Swan, White Pelican,  
and Whooping Crane presented to state museum)
145. 1950. Scaled Quail. Wyo. Wild Life 14(5): 38.
146. 1950. Whooper visits Wyoming. Wyo. Wild Life 14(7):  
27-29. (Whooping Crane southwest of Torrington  
for 2 weeks, beginning Aug. 16, 1950)
147. 1950. Hun flock. Wyo. Wild Life 14(10): 13,37.  
(Hungarian Partridge)
148. 1951. Blue Geese in Wyoming. Wyo. Wild Life 15(5):  
10-11, 35-36. (3 near Hawk Springs, April 1951)
149. 1951. Game bird liberation. Wyo. Wild Life 15(5): 27.  
(pheasants and Chukars released in 1950)
150. 1952. One less whistler. Wyo. Wild Life 16(2): 32.  
(Whistling Swan killed)
151. 1952. Prairie Chicken seen. Wyo. Wild Life 16(2): 32.  
(11 reported seen in Laramie Co., Feb. 8, 1952)
152. 1952. More Turkeys trapped in restoration program.  
Wyo. Wild Life 16(2): 33.
153. 1952. The Wyoming state bird farm. Wyo. Wild Life  
16(4): 19.

154. Anonymous.  
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(Trumpeter Swans)
156. 1954. Bird farm report. Wyo. Wild Life 18(3): 26.  
(pheasant, Chukar and Hungarian partridges released in 1953)
157. 1954. Wyoming ducks travel far after banding. Wyo. Wild Life 18(3): 33. (Mallard and Pintail)
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159. 1954. Flyway count shows waterfowl increase. Wyo. Wild Life 18(5): 14-15.
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166. 1955. Wildlife news roundup: Wyoming geese visit Salton Sea. Wyo. Wild Life 19(1): 33. (Canada Geese banded at Pathfinder seen on Salton Sea, Calif.)
167. 1955. Prairie grouse in Wyoming. Wyo. Wild Life 19(2): 18-23. (Sharp-tailed Grouse, Sage Grouse, Greater Prairie Chicken)
168. 1955. Wildlife news roundup: summersaulting blues. Wyo. Wild Life 19(2): 43. (mating display of male Blue Grouse)
169. 1955. A success story: Turkeys in Wyoming. Wyo. Wild Life 19(3): 24-28. (history and present status of Turkey in Wyo.)
170. 1955. Our smallest game bird, the Mourning Dove. Wyo. Wild Life 19(3): 29-30.
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(National Elk Refuge, Jackson)
173. 1955. Wildlife news roundup: swan strangles on fishing gear. Wyo. Wild Life 19(6): 34. (Whistling Swan)
174. 1955. Wildlife news roundup: Mourning Dove census taken. Wyo. Wild Life 19(7): 33.
175. 1955. Wildlife news roundup: state duck count shows increase. Wyo. Wild Life 19(7): 33.
176. 1955. Wyoming honkers decrease. Wyo. Wild Life 19(8): 4-5. (Canada Geese)
177. 1955. Wildlife news roundup: Mocking Birds seen in southern Wyoming. Wyo. Wild Life 19(8): 35.
178. 1955. Take to the field . . . it's hunting time . . . five species. Wyo. Wild Life 19(11): 22-28.  
(upland game bird hunting)
179. 1955. Wyoming news roundup, wildlife: Trumpeter Swans show a decrease. Wyo. Wild Life 19(12): 35.
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181. 1956. Establishing a fireball! Wyo. Wild Life 20(9): 14-17. (Chukar Partridge)
182. 1956. . . . not as easy as you think. Wyo. Wild Life 20(9): 22-23. (hunting Mourning Dove)

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185. 1957. Boo! Wyo. Wild Life 21(1): 34-38. (owls)
186. 1958. Birds of Hutton Lake National Wildlife Refuge. U. S. Dept. Int., Fish & Wildl. Serv. Refuge Leaflet No. 192. 4 pp.
187. 1958. The snowball bird. Wyo. Wild Life 22(2): 27. (White-tailed Ptarmigan)
188. 1958. Time of the Nighthawk. Wyo. Wild Life 22(7): 26-27.
189. 1958. The tumbler. Wyo. Wild Life 22(7): 36-37. (Golden Eagle)
190. 1958. Wings. Wyo. Wild Life 22(10): 21. (Wyo. waterfowl harvest 1957, predictions for 1958)
191. 1958. Canadas! Wyo. Wild Life 22(10): 22.
192. 1958. Meet Mr. Mallard. Wyo. Wild Life 22(10): 24.
193. 1958. Puddlers? or divers? Wyo. Wild Life 22(10): 25.
194. 1959. Only native bird hunted. Wyo. Wildl. 23(1): 13. (Sage Grouse)
195. 1959. The Sparrowhawk. Wyo. Wildl. 23(3): 25.



196. Anonymous.  
1959. Wildlife windup. Wyo. Wildl. 23(4): 38. (no. of waterfowl wintering in Wyo.; upland game bird harvest)
197. 1959. Wildlife windup. Wyo. Wildl. 23(6): 38.  
(Turkey transplants)
198. 1959. Ups and downs of feathered game. Wyo. Wildl. 23(7): 27-29. (population fluctuations)
199. 1959. Wildlife windup. Wyo. Wildl. 23(7): 38. (no. of Canada Geese breeding in Wyo.)
200. 1959. Mr. Redwing. Wyo. Wildl. 23(8): 12-13.  
(Red-winged Blackbird)
201. 1959. Wildlife windup. Wyo. Wildl. 23(8): 38. (game bird harvest in 1958)
202. 1959. Wildlife windup. Wyo. Wildl. 23(9): 38.  
(results of waterfowl breeding ground survey)
203. 1960. The White-tailed Ptarmigan. Wyo. Wildl. 24(1): 21. (distribution in Wyo.)
204. 1960. Wildlife windup. Wyo. Wildl. 24(1): 39.  
(pheasant and Chukar releases in 1959)
205. 1960. Wildlife windup. Wyo. Wildl. 24(4): 39.  
(Turkeys, winter duck population)
206. 1960. The Golden Eagle. Wyo. Wildl. 24(6): 7-8.
207. 1960. The Western Meadowlark. Wyo. Wildl. 24(8): 35.
208. 1961. Wildlife windup. Wyo. Wildl. 25(3): 38-39.  
(Chukar and pheasant releases; winter waterfowl population)

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1961. Wildlife windup. Wyo. Wildl. 25(7): 38.  
(Bobwhite stocked in Big Horn Basin)
210. 1961. Nighthawks flying. Wyo. Wildl. 25(8): 20-21.
211. 1961. Sage Grouse trapping and banding. Wyo. Wildl.  
25(10): 20-23.
212. 1961. The little Dipper. Wyo. Wildl. 25(12): 19.
213. 1962. Wildlife windup. Wyo. Wildl. 26(4): 39.  
(waterfowl population)
214. 1962. Wildlife windup. Wyo. Wildl. 26(5): 38.  
(Canada Goose production on Ocean Lake)
215. 1962. The white swan. Wyo. Wildl. 26(6): 20-22.  
(Trumpeter Swan)
216. 1962. The fellow on the cover. Wyo. Wildl. 26(8): 27.  
(Killdeer)
217. 1962. Wildlife windup. Wyo. Wildl. 26(9): 38.  
(Canada Goose trapping, banding and transplanting)
218. 1963. Wildlife windup. Wyo. Wildl. 27(2): 39.  
(44 Bald Eagles counted in Wyo.)
219. 1963. The fellow on the cover. Wyo. Wildl. 27(4): 24.  
(Hairy Woodpecker)
220. 1963. Wildlife windup. Wyo. Wildl. 27(5): 39.  
(waterfowl population and Canada Goose production  
at Ocean Lake)
221. 1963. Wildlife windup. Wyo. Wildl. 27(7): 39.  
(number of Canada Geese nesting in Wyo.)

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(annual waterfowl survey)
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(Canada Goose production on Ocean Lake)
225. 1964. Wildlife windup. Wyo. Wildl. 28(8): 39.  
(Canada Goose trapping, banding and transplanting)
226. 1964. Wildlife windup. Wyo. Wildl. 28(9): 39.  
(trapping and banding Canada Geese)
227. 1964. C is for Chukar. Wyo. Wildl. 28(10): 14.
228. 1964. Wildlife windup. Wyo. Wildl. 28(10): 38.  
(Cackling Canada Goose banded at Tule Lake, Calif.,  
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Int., Fish & Wildl. Serv. Refuge Leaflet No.  
176. 4 pp.
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(trapping and banding Canada Geese)
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(Evening Grosbeak)
232. 1966. Wildlife windup. Wyo. Wildl. 30(3): 39.  
(pheasant and Chukar releases)
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(waterfowl census)

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U. S. Dept. Int., Fish & Wildl. Serv. Refuge  
Leaflet No. 224. 3 pp.

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(7 Trumpeter Swan near Cheyenne in March 1968)

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National Park Service, Moose, Wyo. 1 p..  
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Casper, Wyo. 4 pp.

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on Canada Goose nesting activities in the upper  
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Nutcracker hybrid)
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(White Pelicans feeding on tiger salamanders)
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Edinburgh, Scotland.
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201-206. (type of proposed new subspecies of  
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populations)

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on falcons)



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1955. Fifty-fifth Christmas bird count. Audubon Field  
Notes 9: 207. (Casper, Rawlins)
517. 1956. Fifty-sixth Christmas bird count. Audubon Field  
Notes 10: 201. (Casper, Cheyenne, Rawlins)
518. 1957. Fifty-seventh Christmas bird count. Audubon Field  
Notes 11: 207-208. (Casper, Cheyenne, Rawlins)
519. 1958. Fifty-eighth Christmas bird count. Audubon Field  
Notes 12: 218-219. (Casper, Cheyenne)
520. 1959. Fifty-ninth Christmas bird count. Audubon Field  
Notes 13: 230-231. (Casper, Cheyenne)
521. 1960. Sixtieth Christmas bird count. Audubon Field  
Notes 14: 247. (Casper, Cheyenne)
522. 1961. Sixty-first Christmas bird count. Audubon Field  
Notes 15: 262. (Casper, Cheyenne)
523. 1962. Sixty-second Christmas bird count. Audubon Field  
Notes 16: 260-261. (Casper, Cheyenne)
524. 1963. Sixty-third Christmas bird count. Audubon Field  
Notes 17: 255-256. (Casper, Cheyenne, Jackson Hole)
525. 1964. Sixty-fourth Christmas bird count. Audubon Field  
Notes 18: 281-282. (Casper, Cheyenne, Jackson Hole)

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Notes 19: 300-301. (Casper, Cheyenne, Jackson Hole)

527. 1966. Sixty-sixth Christmas bird count. Audubon Field  
Notes 20: 338-339. (Casper, Cheyenne, Dubois,  
Jackson Hole)

528. 1967. Sixty-seventh Christmas bird count. Audubon Field  
Notes 21: 332-333. (Casper, Cheyenne, Dubois,  
Jackson Hole, Seedskadee Natl. Wildl. Refuge)

529. 1968. Sixty-eighth Christmas bird count. Audubon Field  
Notes 22: 347-348. (Casper, Cheyenne, Dubois,  
Seedskadee Natl. Wildl. Refuge)

530. 1969. Sixty-ninth Christmas bird count. Audubon Field  
Notes 23: 375-376. (Casper, Dubois, Jackson Hole,  
Seedskadee Natl. Wildl. Refuge)

531. 1970. Seventieth Christmas bird count. Audubon Field  
Notes 24: 401-402. (Casper, Dubois, Seedskadee  
Natl. Wildl. Refuge, Sheridan)

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Birds 25: 447-449. (Casper, Dubois, Jackson  
Hole, Seedskadee Natl. Wildl. Refuge, Sheridan)

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Birds 26: 463-464. (Casper, Dubois, Seedskadee  
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1965. It's Yellowtail for birds! Wyo. Wildl. 29(12):  
26-29. (Chukar, Hungarian Partridge, Ring-necked  
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537. Davie, O.  
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539. Dawson, W. L.  
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81-83. (a list of birds observed at Green River  
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555. 1945. Variation in Carpodacus purpureus and Carpodacus cassinii. Condor 47: 202-205. (range of Cassin's Finch in Wyo.)
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593. Fowler, R.

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595. 1959. Life history of the Black Rosy Finch. Auk 76: 159-180. (Teton and Absaroka mountains)

596. 1959. Distribution and migration of the Black Rosy Finch. Condor 61: 18-29. (breeding range in Wyo.)

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612. Good, W. M.  
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613. 1954. Regrouping behavior of gulls on Molly Island.  
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1884. Notes on the breeding habits of the American  
Eared Grebe (Dytes nigricollis californicus).  
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620. Greene, A. F. C.  
1957. What about our waterfowl? Wyo. Wild Life 21(11): 28-32. (hunting forecast)
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1874. Preliminary notice of zoology, p. 633. In W. Ludlow, Preliminary report of a reconnoissance to the Black Hills, pp. 628-633. In Annual report of the Secretary of War. 43rd Congr., 2nd Sess., House Exec. Doc. No. 1, Part 2, Vol. 2, Part 2. (Ruffed and Sharp-tailed Grouse mentioned)

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1957. The warblers of America. Devin-Adair Co., New York. (occasional mention of Wyo. records)

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1932-1937.

The book of birds. 2 vols. National Geographic Society, Washington, D. C. (Wyo. mentioned in accounts of some species)

633. Gustafson, R.

1959. The big bird. Wyo. Wildl. 23(8): 14-17. (Turkey)

634. Haecker, F. W.

1944. Notes on the "Blue Grouse" of west central Wyoming. Nebraska Bird Review 12(2): 41. (most specimens were Dendragapus obscurus obscurus with wide, distinct tail bands)

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pp. 268-269. In American big-game hunting.  
(The book of the Boone and Crockett Club), New  
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639. Haines, A. L. and R. L. Grimm.  
1946. Trumpeter Swan. Yellowstone Nature Notes 20(2):  
7-8. (cygnet unable to fly on February 20)
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Wilson Bull. 73: 284-294. (possible elimination  
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Absaroka Range due to overgrazing of alpine  
meadows)
641. Hamerstrom, F.  
1970. An eagle to the sky. Iowa State Univ. Press,  
Ames. (describes release of "rehabilitated"  
Golden Eagle near Casper)
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Fish & Wildl. Serv., Spec. Sci. Rep.--Wildl. No.  
111. ii + 144 pp.
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(summary of history of Trumpeter Swan populations  
south of Canada, including Yellowstone Park, 1932-  
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Fish & Wildl. Serv., Spec. Sci. Rep.--Wildl. No.  
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data)
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646. 1974. An analysis of some aspects of the ecology of  
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Laramie. 161 pp. (Blue Grouse in southeast Wyo.)
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1951. Notes and observations on the Wilson's Warbler.  
Wilson Bull. 63: 143-147. (quotes McCreary, 1939)
648. Hart, R. O.  
1952. Trumpeter Swan vs muskrat at Oxbow Lake. Yellowstone  
Nature Notes 26(5): 56-57.
649. Hasbrouck, E. M.  
1893. The geographical distribution of the genus  
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(Screech Owl, no records for Wyo., but author  
expected to find it in central, western Wyo.)

650. Hawbecker, A. C.

1948. Analysis of variation in western races of the  
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651. Hayden, F. V.

1858. Catalogue and collections in geology and natural  
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Secretary of War. 35th Congr., 2nd Sess., Senate  
Exec. Doc. No. 1, Part 2. (includes a list of  
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Mont. in 1856 and 1857, no locations given)

652. 1863. On the geology and natural history of the Upper  
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1-218. (includes annotated list of birds collected  
on Laramie Peak and in eastern Wyo.)

653. Hazlitt, R. (ed.).

1962. The journal of Francois Antoine Larocque, pp.  
1-28. In J. W. Hakola (ed.)., Frontier omnibus.  
Montana State Univ. Press, Missoula. (Larocque  
mentions crows, cranes seen in northern Wyo. in  
1805)

654. Headstrom, R.

1951. Birds' nests of the West. Ives Washburn, Inc.,  
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655. Henderson, J.

1920. The Varied Thrush in Wyoming. Condor 22: 75.  
(actually Rusty Blackbird, see Henderson 1925)

656. Henderson, J.

1925. Some Colorado and Wyoming records of the Varied Thrush and Rusty Blackbird. Condor 27: 74-76.  
(record of a supposed immature Varied Thrush actually a Rusty Blackbird)

657. Hennessy, W. J.

1953. The Magpie with the dual purpose. Yellowstone Nature Notes 27(5): 55. (Magpie removing dead insects from car bumpers)

658. Henninger, W. F.

1915. June birds of Laramie, Wyoming. Wilson Bull. 27: 221-242. (annotated list of 105 species)

659. Henshaw, H. W.

1884. Description of a new Song Sparrow from the southern border of the United States. Auk 1: 223-224.  
(cites specimen from Fort Bridger of the proposed new subspecies)

660. 1913. Fifty common birds of farm and orchard. Natl. Geogr. Mag. 24: 669-697. (Wyo. mentioned in some species accounts)

661. 1914. Birds of town and country. Natl. Geogr. Mag. 25: 494-531. (Wyo. mentioned in some species accounts)

662. 1915. American game birds. Natl. Geogr. Mag. 28: 105-158. (Wyo. mentioned in some species accounts)

663. Henshaw, H. W.  
1917. Friends of our forests. Natl. Geogr. Mag. 31:  
297-321. (warblers, Wyo. mentioned in accounts  
of some species)
664. Hepworth, W.  
1966. Predation & wildlife management. Wyo. Wildl.  
30(3): 10-16. (Sage Grouse-Golden Eagle predator-  
prey relationship)
665. Hickey, J. J.  
1952. Survival studies of banded birds. U. S. Dept.  
Int., Fish & Wildl. Serv., Spec. Sci. Rep.--  
Wildl. No. 15. 177 pp. (data on Redheads,  
Marsh Hawk from Wyo.)
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38. (Great Horned Owl)
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mendations)

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37(10): 14-17.

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Laramie. vii + 78 pp.
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Amer. Microsc. Soc. 92: 288-291.
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746. 1972. Great Basin-central Rocky Mountain region. Amer. Birds 26: 634-638. (winter season)
747. 1972. Great Basin-central Rocky Mountain region. Amer. Birds 26: 787-791. (spring migration)
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751. 1973. Great Basin-central Rocky Mountain region. Amer. Birds 27: 799-803. (spring migration)

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754. 1974. Mountain west. Amer. Birds 28: 668-672. (winter season)

755. 1974. Mountain west. Amer. Birds 28: 832-836. (spring migration)

756. 1974. Mountain west. Amer. Birds 28: 929-933. (nesting season, unsuccessful nesting attempt of Rough-legged Hawk in Campbell Co.)

757. 1975. Mountain west. Amer. Birds 29: 93-98. (fall migration, Broad-winged Hawks and Black-legged Kittiwakes)

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761. Kittams, W. H.  
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Yellowstone Nature Notes 23(3): 25-29. (74  
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Nature Notes 25(4): 45. (hawk unable to subdue  
Western Meadowlark)
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32(8): 14-20. (American Avocet, Wilson's  
Phalaropes, and Semipalmated Sandpipers)
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(Wyo. hawks)
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Wildl. 33(5): 10-16. (mentions a few birds seen  
along river)
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770. 1969. Wild Turkey. Wyo. Wildl. 33(11): 21-27. (history  
of species in Wyo.)

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White Pelicans summering)
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Notes 16(9-10): 56.
773. 1939. Sand peeps and hot springs. Yellowstone Nature  
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in warm waters)
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1902. The birds of Wyoming. Univ. Wyo. Agr. Exp.  
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Spec. Sci. Rep.--Wildl. No. 89. x + 146 pp.
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Lesson). Auk 48: 207-214. (cites Skinner 1929  
on species nesting in Yellowstone Park)
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8(10): 1, 14-16.

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791. Lincoln, F. C.

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794. 1933. A decade of bird banding in America: a review, pp. 327-351. In Annual report of the Smithsonian Institution for 1932. U. S. Govt. Printing Office. (waterfowl band recoveries in Wyo.)

795. 1935. The migration of North American birds. U. S. Dept. Agr., Circular No. 363. 72 pp. (maps showing migration of Cliff Swallow, Blackpoll Warbler, Harris' Sparrow, American Redstart, Western Tanager, and Red-eyed Vireo)

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797. Linduska, J. P. (ed.).  
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Audubon Field Notes 6: 292-293.
805. 1953. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 7: 28-29.
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observation stations at Laramie and Casper)
808. Lystrup, H. T.  
1947. Observations of the Spotted Sandpiper. Yellowstone  
Nature Notes 21(5): 57-58.
809. 1952. Bird banding--Molly Island. Yellowstone Nature  
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810. 1952. Birds. Yellowstone Nature Notes 26(4): 43.  
(Starlings in park)
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1955. Red-shafted Flickers. Yellowstone Nature Notes  
29(4): 40-41.

813. 1957. Franklin's Gull. Yellowstone Nature Notes 31(2):  
16-17. (juvenal gull near Old Faithful)

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Notes 32(5): 51-52.

815. 1958. Killdeer on Geyser Hill. Yellowstone Nature  
Notes 32(5): 60.

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in Wyo.)

817. MacKay, R. H.

1957. Movements of Trumpeter Swans shown by band  
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1947. Love in the springtime. Yellowstone Nature  
Notes 21(3): 32-33. (Harlequin Ducks)

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Yellowstone Nature Notes 25(1): 1-7. (lists  
107 species)

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1951. Birds find late spring in Yellowstone Park.  
Yellowstone Nature Notes 25(1): 11-12.
821. 1955. Birds about Old Faithful Geyser in winter.  
Audubon Mag. 57: 10-13.
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Notes 32(3): 28-29. (Common Redpolls wintering  
in park)
823. Marshall, D. B. (chairman).  
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committee on conservation 1974-75. Supplement  
to Auk 92(4): 1B-16B. (Trumpeter Swan in Wyo.)
824. Marston, B. W.  
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no page nos. (4-H Club members rear Ring-necked  
Pheasants for release)
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157 pp. (maps show distribution of food plants)
826. Martin, M. D.  
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Fish & Wildl. Serv., Spec. Sci. Rep.--Wildl. No.  
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Fish & Wildl. Serv., Spec. Sci. Rep.--Wildl. No.  
128. ii + 153 pp. (breeding ground and winter  
surveys, population trends 1966-1969, harvest  
data 1967-1968 for Wyo.)
831. Matteson, C. P., Jr.  
1946. Wyoming hawks. Wyo. Wild Life 10(8): 31-34.  
(Sharp-shinned Hawk)
832. 1946. Wyoming hawks. Wyo. Wild Life 10(9): 15, 32-33.  
(Cooper's Hawk)
833. 1948. I raised a Goshawk. Wyo. Wild Life 12(5): 8-13.
834. McAtee, W. L.  
1911. Woodpeckers in relation to trees and wood products.  
U. S. Dept. Agr., Bur. Biol. Surv. Bull. No. 39.  
99 pp. (lodgepole pine damaged by Yellow-bellied  
Sapsucker in Wyo.)
835. McCabe, T. T. and E. B. McCabe.  
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Condor 34: 26-40. (cites specimen from Fort Bridger)

836. McCabe, T. T. and A. H. Miller.  
1933. Geographic variation in the Northern Water-thrushes.  
Condor 35: 192-197. (type of a proposed new  
subspecies collected at Como Lake, Albany Co.)
837. McCafferty, C. E.  
1930. An annotated and distributional list of the  
birds of Wyoming. M. S. Thesis, Univ. Wyo.,  
Laramie. 287 pp.
838. McCreary, O.  
1930. Some recent observations on Wyoming birds. Abstract.  
J. Colo.-Wyo. Acad. Sci. 1(2): 26. (mentions  
sight records of Black Duck, Least Tern, Piping  
Plover, Gyrfalcon, Great Crested Flycatcher,  
Eastern Wood Pewee and Wheatear)
839. 1934. The shifting of the route of migrating birds due  
to wind. Auk 51: 255-256. (several unusual  
spring migrants seen near Torrington due to  
east winds)
840. 1934. Winter records for the Killdeer in Wyoming.  
Bird Lore 36: 108.
841. 1934. Some unusual winter records for birds in Goshen  
County, Wyoming. Condor 36: 170. (Sage Thrasher,  
several species of ducks and hawks)
842. 1934. The Platte River as a migration route for birds.  
Nebraska Bird Review 2(2): 38-39. (mentions  
Least Tern and Herring Gull)

843. McCreary, O.  
1934. Notes on some birds found in winter near Wheatland, Wyoming. Wilson Bull. 46: 123.
844. 1937. Wyoming bird life. Burgess Publ. Co., Minneapolis.  
(treatment of all the birds of the state, lists 332 species, in many of the species accounts the dates of earliest and latest spring and fall appearance in southeast Wyo. is given)
845. 1938. The European Starling in Wyoming. Wyo. Wild Life 3(3): no page nos. (beginning to appear in some numbers in Wyo. by 1937)
846. 1939. Wyoming bird life. Revised ed. Burgess Publ. Co., Minneapolis.
847. 1939. Swainson's Hawk in Wyoming. Wyo. Wild Life 4(2-3): 4, 10.
848. 1942. Guide to ornithological literature. Wyo. Wild Life 7(7): 19. (review of Miller's 1941 paper on genus Junco in relation to Wyo. juncos)
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1935. Bird migration records from southeastern Wyoming. Wilson Bull. 47: 129-157.
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851. McCreary, O. and H. Rahn.  
1941. Why bird restoration in Wyoming? Wyo. Wild Life 6(3): 5-7.

852. McDowell, K.

1956. The proud strutter. Wyo. Wild Life 20(8): 4-7.  
(Sage Grouse)

853. McDowell, K. and W. Higby.

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854. McDowell, R. D.

1948. Turkey population study--Laramie Peak. Pittman-Robertson Quarterly 8(3): 358.

855. McGahan, J.

1968. Ecology of the Golden Eagle. Auk 85: 1-12.  
(2 young eagles banded in Montana were shot in Wyo.)

856. McHugh, T.

1952. Starlings invade buffalo domain. Yellowstone Nature Notes 26(4): 43-44. (first record of Starlings in Yellowstone Park)

857. McIntyre, G.

1953. With Wyoming banders. News from the Bird-Banders 28(3): 27-28. (common birds around Devil's Tower)

858. 1957. Tentative check list of birds, Devil's Tower National Monument, Wyoming. U. S. Dept. Int., Natl. Park Service. 1 p. (83 species including Barn Owl, Ruby-throated Hummingbird)

859. McNutt, J.

1936. Birds at Cooke Ranger Station. Yellowstone Nature Notes 13(5-6): 23-24.

860. Mearns, E. A.

1892. A study of the Sparrow Hawks (subgenus Tinnunculus) of America, with especial reference to the continental species (Falco sparverius Linn.) Auk 9: 252-270.  
(mentions subspecies occurring in Wyo.)

861. 1903. Feathers beside the Styx. Condor 5: 36-38.  
(birds killed by gases in Stygian Cave in Yellowstone Park)

862. Mengel, R. M. and J. S. Mengel.

1952. Sprague [sic] Pipit and Black Rosy Finch in north-central Wyoming in summer. Condor 54: 61-62. (Big Horn Mountains, also mention Marsh Hawk, Horned Lark, Water Pipit, Vesper and Lincoln's sparrows)

863. Merriam, C. H.

1873. Report on the mammals and birds of the expedition, pp. 661-715. In F. V. Hayden, Sixth annual report of the United States Geological Survey of the Territories. 42nd Congr., 3rd Sess., House Misc. Doc. No. 112. (includes information on collections from Teton Canyon, Yellowstone Park and Jackson Hole)

864. Merrill, J. C.

1881. Rare finds. Ornithologist and Oologist 6: 44.  
(mentions several species of birds found breeding in the Big Horn Mountains on the Wyo.-Mont. border)



865. Merrill, J. C.

1881. Oological notes from Montana. Bull. Nuttall Ornith. Club 6: 203-207. (mentions several species of birds found breeding in the Big Horn Mountains on the Wyo.-Mont. border)

866. Mickey, F. W.

1939. Breeding bird census: original prairie. Bird Lore 41(suppl. to no. 5): 17. (grassland area near Laramie)

867. 1940. Breeding bird census: original prairie. Bird Lore 42(suppl. to no. 5): 477. (same area as in 1939)

868. 1943. Breeding habits of McCown's Longspur. Auk 60: 181-209. (study area near Laramie, also mentions other common species of area)

869. Milek, B. and D. Milek.

1969. The Sage Grouse. In Wyoming 2(3): 32-33.

870. Miller, A. H.

1931. Systematic revision and natural history of the American shrikes (Lanius). Univ. Calif. Publ. Zool. 38: 11-242. (mentions Wyo.)

871. 1939. Analysis of some hybrid populations of juncos. Condor 41: 211-214. (mentions hybridization of Gray-headed and Pink-sided juncos in southern Wyo.)

872. Miller, A. H.  
1941. Speciation in the genus Junco. Univ. Calif. Publ. Zool. 44: 173-434. (discusses species in Wyo.)
873. 1948. Further observations on variation in Canyon Wrens. Condor 50: 83-85. (cites specimens from Wyo.)
874. 1955. The breeding range of the Black Rosy Finch. Condor 57: 306-307. (notes occurrence of species in mountains of western Wyo., also notes that Brown-capped Rosy Finch occurs in mountains of southeast Wyo.)
875. Miller, A. H. and T. T. McCabe.  
1935. Racial differentiation in Passerella (Melospiza) lincolni. Condor 37: 144-160. (cites breeding specimens of the Lincoln's Sparrow from Wyo.)
876. Miller, D.  
1969. 30 + 10 (points) = your limit of ducks under the new point system. Wyo. Wildl. 33(11): 32-34.
877. 1973. Ducks--in a land of bucks. Wyo. Wildl. 37(10): 30-33. (duck hunting in northeastern Wyo.)
878. Miller, F. W.  
1925. The nest and eggs of the Black Rosy Finch. Condor 27: 3-7. (in Absaroka Mountains)
879. Miller, M. F.  
1958. Unusual bird sighted on Yellowstone Lake. Yellowstone Nature Notes 32(5): 52-53. (Gannet)

880. Mobley, D.  
1959. Old baldy. Wyo. Wildl. 23(7): 5-7. (Bald Eagle)
881. 1959. The elusive Chukar. Wyo. Wildl. 23(10): 5-7.
882. 1959. Waterfowl hunting prospects. Wyo. Wildl. 23(10):  
12-14.
883. 1960. Waterfowl for 1960. Wyo. Wildl. 24(10): 5-6.
884. 1960. Mourning Doves flying. Wyo. Wildl. 24(12): 10-13.  
(notes on life history, migration)
885. 1961. Talking turkey. Wyo. Wildl. 25(10): 4-7. (Turkey  
hunting)
886. Mohler, L. L.  
1944. Distribution of upland game birds in Nebraska.  
Nebraska Bird Review 12: 1-6. (Bobwhite occur  
along N. Platte River west as far as eastern Wyo.)
887. Moisan, G., R. I. Smith and R. K. Martinson.  
1967. The Green-winged Teal: its distribution, migration,  
and population dynamics. U. S. Dept. Int., Fish  
& Wildl. Serv., Spec. Sci. Rep.--Wildl. No. 100.  
viii + 248 pp. (regular summer resident in Wyo.)
888. Moore, R. T.  
1939. A review of the House Finches of the subgenus  
Burricea. Condor 41: 177-205. (examined  
specimens from Wyo.)
889. Morris, B.  
1975. Getting reacquainted with Mourning Doves. Wyo.  
Wildl. 39(10): 4-5. (basic biology and hunting  
information)

890. Morris, W.  
1972. Our big bird. Wyo. Wildl. 36(10): 5-6. (Sage Grouse)
891. Morrison, C. F.  
1884. Bird notes of the northwest region. Ornithologist and Oologist 9: 54-55. (Great Horned Owl and Gyrfalcon at Fort McKinney near Buffalo)
892. 1884. The Sparrow Hawk. Ornithologist and Oologist 9: 121. (at Fort McKinney near Buffalo)
893. Morrison, K. D.  
1955. Bird protection laws show progress. Audubon Mag. 57: 222-225. (lists 12 species of birds not protected by state)
894. Muchmore, D.  
1973. White-faced Ibis. Wyo. Wildl. 37(9): 24-25.  
(seen near Wilson, Teton Co., mentions nesting attempt at Hutton Lake, Albany Co. in 1964)
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896. 1974. The principle of stratification: zoning regulations for birds. Wyo. Wildl. 38(11): 26-29.
897. 1975. Wildlife mortality is a fact of life. Wyo. Wildl. 39(2): 8-11, 37. (waterfowl mortality from oil spill near Casper, problems associated with artificial winter feeding of Chukars, mortality and reproduction of Bald Eagle)

898. Muchmore, D.

1975. When the sky is alive with Snow Geese. Wyo.  
Wildl. 39(10): 29-30.

899. Muchmore, P. M.

1956. . . . off with a bang! A report on the first Chukar  
hunt in Wyoming. Wyo. Wild Life 20(1): 20-21.

900. 1956. The challenger. Wyo. Wild Life 20(11): 4.  
(Chukar Partridge)

901. Murie, A.

1933. Chickadee occupies a Robin nest. Auk 50: 111.  
(Black-capped Chickadee, Big Sandy River, Sublette  
Co.)

902. 1940. Ecology of the coyote in the Yellowstone. U. S.  
Dept. Int., Natl. Park Serv., Fauna Series No.  
4. 206 pp. (Chapter XI. Birds in relation to  
coyote, mentions ducks, Canada Geese, Trumpeter  
Swans, grouse, Magpies, Ravens)

903. Murie, O. J.

1934. Magpies and Ferruginous Rough-leg feeding  
together. Condor 36: 114. (on road-killed  
jackrabbit in southern Wyo.)

904. 1934. Unusual Mountain Bluebird nests. Condor 36:  
164-165. (using old Robin nest in Jackson Hole)

905. Murie, O. J.  
1935. Food habits of the coyote in Jackson Hole. U. S. Dept. Agr., Circular No. 362. 24 pp. (lists bird remains found in coyote stomachs)
906. 1941. The Starling in Jackson, Wyoming. Wilson Bull. 53: 197. (first seen in spring 1941)
907. 1948. Food of the Great Horned Owl and its place in the fauna. Abstract. Wilson Bull. 60: 66. (analysis of pellets and nest debris in Wyo.)
908. 1962. Why do birds sing? Wilson Bull. 74: 177-182. (mentions fall resurgence of Ruffed Grouse drumming in Jackson Hole)
909. Murphy, J. R.  
1962. Aggressive behavior of a Bald Eagle. Auk 79: 712-713. (in Yellowstone Park a nesting eagle lightly grazed a person trying to photograph nest)
910. Myers, H. W.  
1923. Western birds. MacMillan Co., New York. (Wyo. mentioned in many species accounts)
911. Nakamura, M.  
1950. Tularemia in the Red-tailed Hawk, Buteo jamaicensis calurus. Auk 67: 383-384. (examined a juvenal from Jackson Hole)
912. Neilson, J. A.  
1923. Notes on the Killdeer in southeastern Wyoming. Oologist 40: 13.

913. Neilson, J. A.  
1923. Wheatland, Wyoming birds. Oologist 40: 70-72.  
(annotated list of 76 species)
914. 1923. Screech Owl's eggs. Oologist 40: 156. (found  
one set of 3 eggs near Wheatland)
915. 1923. Notes on the White-throated Swift. Oologist  
40: 158-159. (species nests on the cliffs on  
the western rim of Goshen Hole)
916. 1925. Bird notes from Wheatland, Wyoming. Condor 27:  
72-73. (Virginia Rail, Sora, Grackle, Bobwhite,  
Dickcissel, White-throated Swift, Blue Jay, Lazuli  
Bunting)
917. 1926. Bird notes from Wheatland, Wyoming. Condor  
28: 99-102. (annotated list of 24 species  
observed at southwest base of Laramie Peak)
918. Nelson, M. W.  
1969. The status of the Peregrine Falcon in the  
Northwest, pp. 61-72. In J. J. Hickey (ed.),  
Peregrine Falcon populations, their biology and  
decline. Univ. Wisconsin Press, Madison.  
(mentions 2 nest sites in western Wyo.)
919. Nemick, J.  
1970. Sight-in on spring Turkey. Wyo. Wildl. 34(3):  
8-9. (effects of spring-hunting on population)

920. Nemick, J.  
1972. Sharptail Grouse. Wyo. Wildl. 36(4): 8-11.
921. Nickell, W. P.  
1966. Behavior of Barrow's Goldeneye in Wyoming. Wilson Bull. 78: 121-122. (hen refused to reaccept 2 young that had been separated from her overnight)
922. Norris, J. P.  
1890. A series of eggs of the Prairie Falcon. Ornithologist and Oologist 15: 19-20. (collected eggs from 2 nests along Big Sandy River in Sweetwater Co.)
923. Norris, R. A.  
1958. Comparative biosystematics and life histories of the nuthatches Sitta pygmaea and Sitta pusilla. Univ. Calif. Publ. Zool. 56: 119-300. (cites specimens of Pygmy Nuthatch from Rawhide Butte, northern Goshen Co.)
924. Nuttall, T.  
1840. A manuel of the ornithology of the United States and Canada. The land birds. 2nd ed. Hilliard, Gray and Co., Boston. (includes his observations on birds seen along the Oregon Trail in Wyo. in 1834)
925. Oberhansley, F. R.  
1936. Prey of the Great Horned Owl. Yellowstone Nature Notes 13(1-2): 7-8. (snowshoe hare)



926. Oberhansley, F. R.

1937. The Northern Shrike. Yellowstone Nature Notes  
14(3-4): 16.

927. Oberholser, H. C.

1902. A review of the larks of the genus Otocoris.  
Proc. U. S. Natl. Mus. 24: 801-883. (cites  
specimens of the Horned Lark from Wyo.)

928. 1904. A revision of the American Great Horned Owls.  
Proc. U. S. Natl. Mus. 27: 177-192. (cites  
specimens from Wyo.)

929. 1905. The forms of Vermivora celata (Say). Auk 22:  
242-247. (cites specimens of the Orange-crowned  
Warbler from Wyo.)

930. 1906. The North American eagles and their economic  
relations. U. S. Dept. Agr., Bur. Biol. Surv.  
Bull. No. 27. 31 pp. (maps of breeding ranges)

931. 1907. A new Agelaius from Canada. Auk 24: 332-336.  
(cites specimens from Wyo. of the proposed new  
subspecies of Red-winged Blackbird)

932. 1911. A revision of the forms of the Hairy Woodpecker  
(Dryobates villosus [Linnaeus]). Proc. U. S.  
Natl. Mus. 40: 595-621. (lists many specimens  
from Wyo.)

933. Oberholser, H. C.

1914. A monograph of the genus Chordeiles Swainson, type of a new family of goatsuckers. U. S. Natl. Mus. Bull. 86. vii + 123 pp. (cites specimens of the Common Nighthawk from Wyo.)
934. 1917. Notes on North American birds. II. Auk 34: 321-329. (range of subspecies of the Orange-crowned Warbler and Red Crossbill in Wyo.)
935. 1917. The migration of North American birds. I. Five swallows. Bird-Lore 19: 320-330. (Cliff, Tree, Violet-green, Bank and Rough-winged swallows)
936. 1918. Notes on North American birds. Auk 35: 62-65. (subspecies of Red-winged Blackbird breeding in Wyo.)
937. 1918. Notes on the subspecies of Numenius americanus Bechstein. Auk 35: 188-195. (breeding range of subspecies of Long-billed Curlew in Wyo.)
938. 1918. The migration of North American birds. II. The Scarlet and Louisiana tanagers. Bird-Lore 20: 16-19. (Western Tanager)
939. 1918. The migration of North American birds. Second series. III. The Summer and Hepatic tanagers, martins, and Barn Swallows. Bird-Lore 20: 145-152. (Barn Swallow)
940. 1918. The migration of North American birds. Second series. IV. The waxwings and Phainopepla. Bird-Lore 20: 219-222. (Bohemian Waxwing)

941. Oberholser, H. C.

1918. The migration of North American birds. Second series. V. The shrikes. Bird-Lore 20: 286-290.

942. 1918. The migration of North American birds. Second series. VI. Horned Larks. Bird-Lore 20: 345-349. (includes map delineating breeding ranges of the then recognized races)

943. 1918. New light on the status of Empidonax traillii (Audubon). Ohio J. Sci. 18: 85-98. (cites one specimen from Wyo. of a proposed new subspecies of Traill's Flycatcher)

944. 1919. Larus canus brachyrhynchus in Wyoming. Auk 36: 276-277. (Mew Gull collected in Wind River Mountains, Lake Fork, on August 28, 1893)

945. 1919. The migration of North American birds. Second series. VIII. Ravens. Bird-Lore 21: 23-24.

946. 1919. The migration of North American birds. Second series. X. Blue Jay, Steller's Jay, and Green Jay. Bird-Lore 21: 170-171. (Steller's Jay)

947. 1919. The migration of North American birds. Second series. XI. Canada Jay, Oregon Jay, Clarke's [sic] Nutcracker, and Piñon Jay. Bird-Lore 21: 354-355. (Gray Jay, Clark's Nutcracker)

948. Oberholser, H. C.
1919. An unrecognized subspecies of Melanerpes erythrocephalus. Canadian Field-Nat. 33: 48-50. (cites specimens from Wyo. of the proposed new subspecies of Red-headed Woodpecker)
949. 1920. The migration of North American birds. Second series. XIII. European Starling and the Bobolink. Bird-Lore 22: 213-216. (Bobolink)
950. 1920. A synopsis of the genus Thryomanes. Wilson Bull. 32: 18-28. (cites specimens of Bewick's Wren from southwest Wyo.)
951. 1921. The migration of North American birds. Second series. XV. Yellow-headed Blackbird and meadowlarks. Bird-Lore 23: 78-82. (Western Meadowlark)
952. 1921. The migration of North American birds. Second series. XVII. Rusty Blackbird and Brewer [sic] Blackbird. Bird-Lore 23: 295-299. (Brewer's Blackbird)
953. 1922. The migration of North American birds. Second series. XVIII. Red-winged Blackbirds. Bird-Lore 24: 85-88.
954. 1923. The migration of North American birds. Second series. XXII. Bullock's Oriole and Hooded Oriole. Bird-Lore 25: 243-244. (Bullock's Oriole)

955. Oberholser, H. C.  
1924. The migration of North American birds. Second series. XXIV. Ruby-throated, Black-chinned, and Calliope hummingbirds. Bird-Lore 26: 108-111. (Calliope Hummingbird)
956. 1924. The migration of North American birds. Second series. XXVI. Broad-tailed, Rufous, and Allen's hummingbirds. Bird-Lore 26: 398-399. (Broad-tailed Hummingbird)
957. 1926. The migration of North American birds. Second series. XXXI. The nighthawks. Bird-Lore 28: 255-261. (Common Nighthawk)
958. 1927. The migration of North American birds. Second series. XXXIII. The flickers. Bird-Lore 29: 110-114. (Red-shafted Flicker)
959. 1927. The migration of North American birds. Second series. XXXV. Red-headed and Lewis' Woodpecker. Bird-Lore 29: 411-413. (Lewis' Woodpecker)
960. 1928. The migration of North American birds. Second series. XXXVI. Pileated and Ant-eating woodpeckers. Bird-Lore 30: 112-113. (Pileated Woodpecker said to occur in northwest Wyo.)
961. 1928. The migration of North American birds. Second series. XXXVII. Yellow-bellied and Red-naped sapsuckers. Bird-Lore 30: 253-257. (records of both races from Yellowstone Park)

962. Oberholser, H. C.  
1928. The migration of North American birds. Second series. XXXVIII. Williamson's Sapsucker and White-headed Woodpecker. Bird-Lore 30: 388.  
(Williamson's Sapsucker)
963. 1929. The migration of North American birds. Second series. XXXIX. Three-toed woodpeckers. Bird-Lore 31: 110.
964. 1930. The migration of North American birds. Second series. XLIV. Kingfishers. Bird-Lore 32: 414-417. (Belted Kingfisher)
965. Oldaker, R. F.  
1960. A survey of the California Gull, carried out in 1959. News from the Bird Banders 35(3): 30-32. (birds banded in Wyo. sighted at Vancouver, B. C.)
966. 1961. 1960 survey of the California Gull. Western Bird Bander 36(3): 26-30. (birds banded in Wyo. sighted at Vancouver, B. C.)
967. 1963. Sight records of banded California Gulls. Western Bird Bander 38(1): 7-10. (Birds banded in Wyo. sighted at Vancouver, B. C.)

968. Ossa, H.  
1973. They saved our birds. Hippocrene Books, Inc.,  
New York. (Trumpeter Swans in Yellowstone Park)
969. Owens, W. S.  
1941. The Chukar Partridge. Wyo. Wild Life 6(4): 8,  
16-17.
970. Padget, G.  
1956. The perfect angler. Wyo. Wild Life 20(10): 33.  
(Osprey)
971. 1957. Sage country showman. Wyo. Wild Life 21(9): 4-6.  
(Sage Grouse)
972. 1958. The snowball bird. Wyo. Wild Life 22(2): 27.  
(White-tailed Ptarmigan)
973. Palmer, R. S. (ed.).  
1962. Handbook of North American birds. Vol. 1. Loons  
through flamingos. Yale Univ. Press, New Haven,  
Connecticut.
974. Palmer, T. S.  
1900. Legislation for the protection of birds other  
than game birds. U. S. Dept. Agr., Bur. Biol.  
Surv. Bull. No. 12. 94 pp. (summary of Wyo.  
laws)
975. 1902. Legislation for the protection of birds other  
than game birds. Revised ed. U. S. Dept. Agr.,  
Bur. Biol. Surv. Bull. No. 12. 143 pp.  
(summary of Wyo. laws)

976. Palmer, T. S.

1907. Notes on the summer birds of the Yellowstone National Park, pp. 543-551. In Annual report of the Superintendent of the Yellowstone National Park, pp. 531-554. In Reports of the Department of the Interior for the fiscal year ended June 30, 1907. Vol. 1. U. S. Govt. Printing Office. (annotated list of 74 species)
977. 1912. The Calaveras Warbler in the Yellowstone National Park. Condor 14: 224-225. (Nashville Warbler)
978. 1912. National reservations for the protection of wild life. U. S. Dept. Agr., Bur. Biol. Surv. --Circular No. 87. 32 pp. (lists national parks and wildlife refuges in Wyo. with a bibliography of publications on wildlife of these areas)
979. 1913. The Harlequin Duck in Wyoming. Auk 30: 106-107. (see next reference)
980. 1913. Additional notes on the Harlequin Duck in Wyoming. Auk 30: 267-268. (2 males killed on Snake River near outlet of Jackson Lake in 1907)
981. 1918. Birds of the national parks. Auk 35: 492-493. (mentions availability of a check-list of the birds of Yellowstone Natl. Park)



982. Palmer, T. S.

1920. Birds of the national parks. Auk 37: 614.

(points out that M. P. Skinner is actually the author of the checklist of birds of Yellowstone Natl. Park)

983. Patterson, R. L.

1949. Sage Grouse along the Oregon Trail. Wyo. Wild Life 13(8): 4-15, 34-37.

984. 1950. The Sage Grouse in the upper Green River basin. Proc. Western Assoc. State Game & Fish Comm. 30: 173-179.

985. 1950. Sage Grouse populations and land utilization patterns in the mountain West. Wyo. Wild Life 14(5): 4-11, 29-35.

986. 1952. The Sage Grouse in Wyoming. Wyo. Game & Fish Commission, Sage Books, Inc., Denver, Colo.

987. 1952. Sage Grouse hunting seasons. Wyo. Wild Life 16(7): 10-13. (discusses effects of autumn versus summer hunting on breeding populations)

988. 1953. Status of the Canada Goose in Wyoming. Proc. Western Assoc. State Game & Fish Comm. 33: 194-200.

989. 1953. Weather . . . key to hunting success. Wyo. Wild Life 17(11): 16-21. (Sage Grouse, pheasants, waterfowl hunting)

990. Patterson, R. L.  
1954. Restoring the Canada Goose. Wyo. Wild Life  
18(7): 12-15.
991. 1955. 1954 upland game bird harvests. Wyo. Wild Life  
19(3): 22-23, 37-38.
992. Patterson, R. L. and R. M. Ballou.  
1952. A report on the Wyoming waterfowl survey. Wyo.  
Wild Life 16(11): 16-19, 22-23. (survey of  
waterfowl production primarily west of the  
Continental Divide)
993. 1953. The status of the Canada Goose in Wyoming. Wyo.  
Wild Life 17(8): 4-14, 36.
994. Patterson, R. L. and D. Cram.  
1949. Sage Grouse in the West. Wyo. Wild Life 13(10):  
10-13, 37-38.
995. Patterson, R. L., E. F. Putnam and H. B. Sanderson.  
1950. Trapping Sage Grouse in Wyoming. Wyo. Wild Life  
14(3): 4-13.
996. Pattie, D. L. and N. A. M. Verbeek.  
1966. Alpine birds of the Beartooth Mountains. Condor  
68: 167-176. (annotated list of 62 species  
observed on the Wyoming-Montana border, mention  
late-summer influx of raptores into alpine area)

997. Peabody, P. B.  
1905. The Tolmie Warbler in Wyoming. Warbler 1: 77-80.  
(MacGillivray's Warbler, observations in Crook  
and Weston cos.)
998. 1905. The Long-tailed Chickadee. Warbler 1: 118-124.  
(Black-capped Chickadee in northeast Wyo.)
999. 1906. Pinyon Jay (the bird that never breeds). Warbler  
2: 40-47. (natural history in northeast Wyo.)
1000. 1906. Rocky Mountain Nuthatch. Warbler 2: 50-55.  
(White-breasted Nuthatch breeding in northeast  
Wyo.)
1001. 1907. The crossbills of northeastern Wyoming. Auk  
24: 271-278. (nesting of Red Crossbills in  
Black Hills of Wyo.)
1002. 1907. The breeding of the Arctic Towhee. Warbler 3:  
2-6. (Rufous-sided Towhee in northeast Wyo.)
1003. 1907. Rock Wren the cliff dweller. Warbler 3: 7-14.  
(nesting in northeast Wyo.)
1004. 1909. Chat, the pantaloon. Warbler 5: 10-14.  
(Yellow-breasted Chat in northeast Wyo.)
1005. 1935. Rim rock and solitaire. Wilson Bull. 47: 257-  
265. (Townsend's Solitaire in northeast Wyo.)
1006. Pearson, T. G.  
1917. The Sage Grouse. Bird-Lore 19: 112-115.  
(mentions species in Wyo.)

1007. Pearson, T. G.

1929. Riding the Yellowstone boundary. Bird-Lore  
31: 373-376. (mentions birds seen during  
inspection of park boundary)

1008. Pearson, T. G. (ed.).

1928. News and notes: Pathfinder Reservation reestablished  
as Pathfinder Bird-Refuge. Bird Lore 30: 304.  
(Pathfinder Reservation created 1909, abolished  
1922, reestablished as a bird refuge)

1009. 1931. News and notes: wild life in national parks.  
Bird Lore 33: 100-101. (mentions White Pelicans  
in Yellowstone Park)

1010. Pendergraft, A.

1957. A matter of skill. Wyo. Wild Life 21(11): 38.  
(information on habits and hunting of wild Turkeys)

1011. 1963. No easy target. Wyo. Wildl. 27(11): 17. (Chukar  
hunting)

1012. Peterson, F. B.

1950. Washakie County Magpie control. Wyo. Wild Life  
14(4): 30-31.

1013. Peterson, R. T.

1948. Birds over America. Dodd, Mead and Co., New  
York. (Great Gray Owl in Tetons)

1014. Pettingill, O. S., Jr.  
1953. A guide to bird finding west of the Mississippi.  
Oxford Univ. Press, New York. (Wyoming pp. 617-  
643: some place names have changed, but still an  
excellent general reference to bird finding in Wyo.)
1015. 1958. Bird finding with Sewell Pettingill. Audubon Mag.  
60: 30-31, 34. (Sage Grouse in Eden-Farson area)
1016. 1959. Bird finding with Sewall Pettingill. Audubon Mag.  
61: 176-177. (Yellowstone Natl. Park in winter)
1017. 1968. Birding down the river. Audubon 70(5): 6-19.  
(guide to bird finding in Jackson Hole)
1018. Pettingill, O. S., Jr. and N. R. Whitney, Jr.  
1965. Birds of the Black Hills. Spec. Publ. No. 1.  
Cornell Lab. of Ornith., Ithaca, New York.  
(includes Wyo. part of Black Hills)
1019. Phillips, A. R.  
1947. The races of MacGillivray's Warbler. Auk 64:  
296-300. (specimens of a proposed new subspecies  
from Wyo.)
1020. 1947. Records of occurrence of some southwestern birds.  
Condor 49: 121-123. (Gray Flycatcher collected  
at Fort Bridger)
1021. Pickett, W. D.  
1888. The hardy Snipe. Forest and Stream 30: 24.  
(Common Snipe wintering in Wyo.)

1022. Pierson, M.

1969. Magpie--bird with a pied reputation. Wyo. Wildl.  
33(7): 22-23.

1023. Pitelka, F. A.

1941. Distribution of birds in relation to major biotic  
communities. Amer. Midl. Nat. 25: 113-137.  
(correlation of the range of species with major  
biotic communities, grouse species examples  
occurring in Wyo.)

1024. 1951. Speciation and ecological distribution in  
American jays of the genus Aphelocoma. Univ.  
Calif. Publ. Zool. 50: 195-464. (Scrub Jay  
irregular visitor in southern and southwestern  
Wyo.)

1025. Pospahala, R. S., D. R. Anderson and C. J. Henny.

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breeding habitat conditions, size of breeding  
populations and production indices. U. S. Dept.  
Int., Fish & Wildl. Serv., Resource Publ. No.  
115. iv + 73 pp. (a continuation of Anderson  
and Henny, 1972)

1026. Post, G.

1951. A study of aldrin insecticide, its effects on  
birds and other wildlife. Wyo. Wild Life  
15(9): 4-9, 32-36.

1027. Post, G.  
1951. A study of aldrin insecticide. Wyo. Wild Life  
15(10): 31. (correction of preceeding article)
1028. Potter, F. C.  
1948. A Great Gray Owl family at Lake. Yellowstone  
Nature Notes 22(4): 45-46.
1029. Potter, L. B.  
1936. Northern records of the Mockingbird. Condor 38:  
88. (quotes McCreary that the Mockingbird is  
a regular breeding bird of southeastern Wyo., but  
no records for northern Wyo.)
1030. Pough, R. H.  
1957. Audubon western bird guide. Doubleday & Co.,  
Inc., Garden City, New York.
1031. Power, D. M.  
1969. Evolutionary implications of wing and size  
variation in the Red-winged Blackbird in relation  
to geographic and climatic factors: a multiple  
regression analysis. Syst. Zool. 18: 363-373.  
(examined one bird from Wyo.)
1032. Pyrah, D.  
1958. Wyoming's Sage Grouse management program. Proc.  
Western Assoc. State Game & Fish Comm. 38: 184-186.
1033. 1958. Sage Grouse season: early vs. late. Wyo. Wild  
Life 22(9): 5-8.

1034. Pyrah, D.

1960. Eden Valley chicken season. Wyo. Wildl. 24(1):  
26-29. (seven years of Sage Grouse hunting data  
from Eden area)

1035. 1960. Mountain grouse: a report on last fall's season.  
Wyo. Wildl. 24(1): 31-32. (Ruffed and Blue grouse)

1036. Ranson, S.

1975. Wyoming's state bird: the meadowlark. Wyo.  
Wildl. 39(7): 12-13, 34.

1037. Rasmussen, D. I. and L. A. Griner.

1938. Life history and management of the Sage Grouse  
in Utah, with special reference to nesting  
and feeding habits. Trans. N. Amer. Wildl. Conf.  
3: 852-864. (several references to Wyo. grouse)

1038. Ray, G.

1974. Fool hen blues. Wyo. Wildl. 38(1): 5-6.  
(Blue Grouse hunting)

1039. [Reed, B.] Veteran.

1874. The sage cock. Forest and Stream 2:66. (brief  
description of habits of the Sage Grouse based  
on author's observations while in army in West)

1040. Reed, W. H.

1882. A remarkable contest. Forest and Stream 19: 325.  
(eagle dives repeatedly at two young antelope  
near Como, Albany Co.)



1041. Replugle, W. T.

1958. The Starling comes to Yellowstone National Park.  
Yellowstone Nature Notes 32(5): 61. (Starlings  
at Canyon in 1958)

1042. Replugle, W. T., F. H. Brady and K. Agerter.

1939. Notes on the Osprey (Pandion haliaetus carolinensis)  
Yellowstone Nature Notes 16(7-8): 40-44.

1043. Rich, W. H.

1924. Progress in biological inquiries, 1923, report of  
Division of Scientific Inquiry, fiscal year 1923.  
Appendix VII. 27 pp. In Annual report of the  
U. S. Commissioner of Fisheries, fiscal year 1923.  
Bureau of Fisheries Doc. No. 956. (mentions  
"Destruction of trout by pelicans in Yellowstone  
National Park")

1044. Ridgway, R.

1869. Notices of certain obscurely known species of  
American birds. Proc. Acad. Nat. Sci. Phila.  
21: 125-135. (mentions specimen of Swainson's  
Thrush from Fort Bridger)

1045. 1873. The birds of Colorado. Bull. Essex Inst. 5(3):  
33-201. (the type of the proposed new subspecies  
of Gray Jay supposedly collected on Henry's Fork,  
Wyo., is actually from Utah, see Woodbury and  
Cottam 1944)

1046. Ridgway, R.  
1873. The grouse and quails of North America discussed in relation to their variation with habitat. Forest and Stream 1: 289-290. (Sage Grouse in Wyo.)
1047. 1875. A monograph of the genus Leucosticte, Swainson; or gray-crowned purple finches. Bull. U. S. Geol. and Geogr. Surv. Terr. Vol. 1, No. 2, 2nd Series, pp. 51-82. (examined many specimens of the Gray-crowned Rosy Finch from Wyo.)
1048. 1877. On geographical variation in Turdus migratorius. Bull. Nuttall Ornith. Club 2: 8-9. (type of a proposed new subspecies of American Robin collected on Laramie Peak)
1049. 1880. Revisions of nomenclature of certain North American birds. Proc. U. S. Natl. Mus. 3: 1-16. [Smiths. Misc. Coll. Vol. 22] (the type of a proposed new subspecies of Northern Waterthrush collected in the Black Hills, Wyo. = Como Lake, Albany Co.)
1050. 1880. A catalogue of the birds of North America. Proc. U. S. Natl. Mus. 3: 163-246. [Smiths. Misc. Coll. Vol. 22] (cites specimens of Dark-eyed Junco from Wyo.)

1051. Ridgway, R.

1881. Catalogue of Trochilidae in the collection of the United States National Museum. Proc. U. S. Natl. Mus. 3: 308-320. [Smiths. Misc. Coll. Vol. 22] (lists specimens of the Broad-tailed Hummingbird from Fort Bridger)

1052. 1881. Descriptions of two new thrushes from the United States. Proc. U. S. Natl. Mus. 4: 374-379. [Smiths. Misc. Coll. Vol. 22] (cites specimens from Wyo. of a proposed new subspecies of Veery)

1053. 1884. Descriptions of some new North American birds. Proc. Biol. Soc. Wash. 2: 89-95. (Wyo. specimens of Sharp-tailed Grouse collected east of the Continental Divide said to belong to a proposed new subspecies)

1054. 1887. A manual of North American birds. J. B. Lippincott Co., Philadelphia. (Wyo. mentioned in some species accounts)

1055. 1890. The humming birds, pp. 253-383. In Annual report of the U. S. National Museum for the year ending June 30, 1890. 51st Congr., 2nd Sess., House Misc. Doc. No. 129, Part 2. (description of an adult male Broad-tailed Hummingbird collected at Fort Bridger)

1056. Ridgway, R.  
1897. Note on Junco annectens Baird and J. ridgwayi  
Mearns. Auk 14: 94. (cites specimens from Wyo.  
of Dark-eyed Juncos)
1057. 1901-1946.  
The birds of North and Middle America. U. S.  
Nat'l. Mus. Bull. 50, Parts 1-10. (continued by  
H. Friedmann 1950)
1058. Robbins, C. S.  
1947. Preliminary map showing the winter distribution  
of the Red Crossbill. Audubon Field Notes 1: 182.
1059. 1948. Preliminary map showing the breeding distribution  
of the Vesper Sparrow. Audubon Field Notes 2: 147.
1060. 1949. Distribution of North American birds: the breeding  
distribution of the Virginia Rail. Audubon Field  
Notes 3: 238-239.
1061. 1950. Distribution of North American birds: winter  
distribution of the Sora. Audubon Field Notes  
4: 40. (map indicates Sora is a rare wintering  
species in extreme southeast Wyo.)
1062. Robbins, C. S. (ed.).  
1948. Forty-eighth Christmas bird count. Audubon  
Field Notes 2: 107. (Kemmerer)
1063. 1949. Forty-ninth Christmas bird count. Audubon Field  
Notes 3: 136. (Casper, Moose)

1064. Robbins, C. S. (ed.).  
1950. Fiftieth Christmas bird count. Audubon Field  
Notes 4: 159-160. (Casper, Grand Teton Natl. Park)
1065. 1951. Fifty-first Christmas bird count. Audubon Field  
Notes 5: 164. (Casper)
1066. 1952. Fifty-second Christmas bird count. Audubon Field  
Notes 6: 154. (Casper)
1067. 1953. Fifty-third Christmas bird count. Audubon Field  
Notes 7: 168. (Casper)
1068. Robbins, C. S. and W. T. Van Velzen.  
1969. The breeding bird survey 1967 and 1968. U. S.  
Dept. Int., Fish & Wildl. Serv., Spec. Sci.  
Rep.--Wildl. No. 124. iv + 107 pp. (in 1968  
ten 25-mile routes were surveyed in Wyo., the  
average no. of birds per route by species is  
tabulated)
1069. Robertson, J. M.  
1928. Returns of banded gulls. Condor 30: 354-355.  
(2 gulls [California or Ring-billed, author does  
not distinguish] banded near Camrose, Alberta,  
recovered in Wyo.)
1070. 1929. Some results of bird banding in 1928. Condor  
31: 242-247. (additional records of gulls banded  
near Camrose, Alberta, being recovered in Wyo.)

1071. Robinson, G.

1974. Strike up the band, birds and banders harmonize.  
Wyo. Wildl. 38(6): 14-17, 34. (bird-banding)

1072. Robinson, H.

1971. Looking upwind at upland game birds. Wyo. Wildl.  
35(10): 3.

1073. Rochester, A. M.

1954. Tragedy in the Black Sand Geyser Basin. Yellowstone  
Nature Notes 28(5): 49. (Mallard hen and ducklings  
scalded in hot pool)

1074. Roest, A. I.

1957. Notes on the American Sparrow Hawk. Auk 74: 1-19.  
(cites Williams and Matteson 1948)

1075. Rogers, C. H.

1932. Prothonotary Warbler in Wyoming. Auk 49: 91-92.  
(one at Mammoth Hot Springs, Yellowstone Natl.  
Park, Sept. 1931)

1076. 1939. A new swift from the United States. Auk 56:  
465-468. (cites specimens from Wyo. of a proposed  
new subspecies of White-throated Swift)

1077. Rogers, G. E.

1963. Blue Grouse census and harvest in the United  
States and Canada. J. Wildl. Mgmt. 27: 579-585.  
(some data from Wyo.)

1078. Rogers, T.

1955. Palouse--northern Rocky Mountain region. Audubon Field Notes 9: 41-44. (notes on birds of north-west Wyo.)

1079. Roop, L.

1972. Those marvelous songsters. Wyo. Wildl. 36(6): 21-25. (bird-watching in Wyo.)

1080. 1973. Reapers of the wind. Wyo. Wildl. 37(1): 15-19. (Wyo. hawks)

1081. 1973. Eagles today. Wyo. Wildl. 37(6): 14-19. (reassessment of Colorado-Wyoming eagle killings and related factors)

1082. Roosevelt, T.

1904. Wilderness reserves, pp. 23-51. In American big game in its haunts. Book of the Boone and Crockett Club, New York. (mentions a few birds seen in Yellowstone Natl. Park)

1083. Rosche, R. C.

1954. Notes on some birds of Yellowstone National Park. Wilson Bull. 66: 60. (notes on 8 species)

1084. Royall, W. C., Jr., J. W. De Grazio, J. L. Guarino and A. Gammell.

1971. Migration of banded Yellow-headed Blackbirds. Condor 73: 100-106. (one banded in Wyo. migrated eastward)

1085. Rubey, W. W.

1933. Flight maneuvers of the Raven. Bird-Lore 35: 143-145. (diving and spinning flights of a flock over Wyoming Peak)

1086. Ruos, J. L.

1970. Mourning Dove status report, 1969. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.-- Wildl. No. 132. iv + 35 pp. (Wyo. data included)

1087. 1972. Mourning Dove status report, 1971. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.-- Wildl. No. 158. iv + 40 pp. (trends in Wyo. breeding density 1961-71, changes in breeding density index 1970-71)

1088. 1974. Mourning Dove status report, 1972. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.-- Wildl. No. 176. iv + 35 pp. (trends in breeding density in Wyo., 1962-72)

1089. 1974. Mourning Dove status report, 1973. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.-- Wildl. No. 186. iv + 36 pp.

1090. Ruos, J. L. and D. McDonald.

1968. Mourning Dove status report, 1967. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.-- Wildl. No. 121. iv + 23 pp.



1091. Ruos, J. L. and D. McDonald.  
1970. Mourning Dove status report, 1968. U. S. Dept. Int.,  
Fish & Wildl. Serv., Spec. Sci. Rep.--Wildl. No.  
129. iv + 38 pp.
1092. Ruos, J. L. and R. E. Tomlinson.  
1968. Mourning Dove status report, 1966. U. S. Dept.  
Int., Fish & Wildl. Serv., Spec. Sci. Rep.--  
Wildl. No. 115. iv + 49 pp. (Wyo. breeding  
density indices based on call-counts)
1093. Ruskanen, A.  
1962. For Mallards, a helping hand. Wyo. Wildl. 26(8):  
28-32. (small pond construction and artificial  
nest boxes, also mentions artificial nest structures  
for Canada Geese on Ocean Lake)
1094. 1962. There's something new in waterfowl season. Wyo.  
Wildl. 26(10): 12-15. (Continental Divide new  
division between Pacific and Central flyways)
1095. 1963. The magnificent golden. Wyo. Wildl. 27(6): 8-12.  
(Golden Eagle)
1096. 1963. Bobwhite for Wyoming. Wyo. Wildl. 27(11): 6-10.  
(stocking programs in northern Wyo.)
1097. 1965. A bonus for shotgunners. Wyo. Wildl. 29(6): 27-28.  
(Blue-winged Teal, some information on species in  
Wyo.)

1098. Ruskanen, A.

1965. The great flights: the great slaughter. Wyo. Wildl. 29(8): 20-24. (history of Passenger Pigeon in N. Amer., mentions specimen collected by Chas. McCarthy west of Fort Laramie in 1859)

1099. 1965. Birds for the hunter. Wyo. Wildl. 29(9): 10-13. (nine species of upland game birds in Wyo.)

1100. Ryder, R. A.

1962. Migration and population dynamics of American Coots in western North America. Proc. XIII Intern. Ornith. Congr. 13: 441-453. (some birds recovered in Wyo.)

1101. 1964. California Gull nesting in Colorado. Condor 66: 440-441. (mentions nesting colonies on Bamforth, Twelve Mile and Twin Buttes lakes, Albany Co.)

1102. Salt, G. W.

1957. Observations on Fox, Lincoln and Song sparrows at Jackson Hole, Wyoming. Auk 74: 258-259.

1103. 1957. An analysis of avifaunas in the Teton Mountains and Jackson Hole, Wyoming. Condor 59: 373-393. (bird populations in six vegetation types)

1104. Saul, R. H.

1971. Influences of man-made nesting structures on Canada Geese. M. S. Thesis, Univ. Wyo., Laramie. x + 119 pp. (Bear River)

1105. Saul, R. H.  
1972. Structurally speaking. Wyo. Wildl. 36(10): 15-16.  
(artificial nesting structures and man-made islands  
for Canada Geese)
1106. Saul, R. H. and L. Serdiuk.  
1974. The waterfowl story with fresh perspectives. Wyo.  
Wildl. 38(10): 20-24, 34.
1107. Sawyer, E. J.  
1925. Rocky Mountain Jay using its feet for carrying  
purposes. Condor 27: 36. (in Yellowstone Park)
1108. 1925. Wood Ibis added to list of Yellowstone birds.  
Parks and Recreation 9: 86.
1109. 1925. Wood Ibis added to the list of Yellowstone birds.  
Yellowstone Nature Notes 11(4): 6.
1110. 1926. The Wood Ibis in Yellowstone Park. Auk 43:  
134-135.
1111. 1926. Trumpeter Swans survive. Nature Mag. 8: 374.  
(Yellowstone Natl. Park)
1112. 1928. The courtship behavior of Barrow's Golden-eye.  
Wilson Bull. 40: 5-17. (studied in Yellowstone  
Natl. Park)
1113. Sawyers, M.  
1971. An owl's place. Wyo. Wildl. 35(10): 26-29.  
(Wyo. owls)

1114. Sayre, R.

1971. Econotes: the eagle poisoners apparently haven't given up. Audubon 73(6): 110. (another dying eagle found in Jackson Canyon near Casper)

1115. Schaller, G. B.

1964. Breeding behavior of the White Pelican at Yellowstone Lake, Wyoming. Condor 66: 3-23.  
(also mentions first collection of a White Pelican in Yellowstone in 1863)

1116. Schorger, A. W.

1955. The Passenger Pigeon, its natural history and extinction. Univ. Wisconsin Press, Madison.  
(mentions single specimen from Wyo., collected west of Fort Laramie in 1859)

1117. 1966. The wild Turkey, its history and domestication. Univ. Oklahoma Press, Norman. (synopsis of introduction and plantings of Merriam's Turkey in Wyo.)

1118. Schroeder, L. D. and S. M. Carney.

1974. Distribution of duck stamp sales within states during fiscal years 1962-71. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.--Wildl. No. 180. 46 pp.

1119. Schroeder, M. H.

1972. Vesper Sparrow nests abandoned after snow. Wilson Bull. 84: 98-99. (near Saratoga)

1120. Scott, C. K., G. C. Scott and H. H. Scott.

1965. Sagebrush foothills. Audubon Field Notes 19:  
610. (breeding bird census near Casper, part of  
a study on effects of spraying sagebrush with  
2, 4-D)

1121. Scott, C. K., O. K. Scott and H. H. Scott.

1964. Sagebrush foothills. Audubon Field Notes 18:  
562-563. (breeding bird census near Casper, part  
of a study on effects of spraying sagebrush with  
2, 4-D)

1122. Scott, G. C., O. K. Scott and H. H. Scott.

1966. Sagebrush foothills. Audubon Field Notes 20:  
657-658. (breeding bird census near Casper, part  
of a study on effects of spraying sagebrush with  
2, 4-D)

1123. Scott, J. W.

1930. An interesting animal association. Abstract.  
J. Colo.-Wyo. Acad. Sci. 1(3): 59-60. (livers  
of white-tailed prairie dogs infested with  
tapeworms were fed to young Ferruginous and  
Red-tailed hawks, only Ferruginous Hawks developed  
a tapeworm infection)

1124. 1931. Some nesting habits of the Ferruginous Roughleg  
Hawk. Abstract. J. Colo.-Wyo. Acad. Sci. 1(4):  
57-58. (Ferruginous Hawk in Wyo.)

1125. Scott, J. W.  
1933. Observations on birds on Molly Islands, Yellowstone Park. Abstract. J. Colo.-Wyo. Acad. Sci. 1(6): 71-72. (nos. of nesting California Gulls, White Pelicans, Caspian Terns)
1126. 1936. The sage hen. The grouse family. Wyo. Wild Life 1(12): no page nos.
1127. 1937. Some effects of drouth years on the bird and animal population of Wyoming. Abstract. J. Colo.-Wyo. Acad. Sci. 2(4): 27.
1128. 1937. Planning for recreation and wildlife in Wyoming. VIII. Song birds. Insectivorous and seed-eating birds. Wyo. Wild Life 2(1): no page nos.
1129. 1939. The role of coccidia as parasites of wild life. Abstract. J. Colo.-Wyo. Acad. Sci. 2(6): 45. (coccidiosis in Sage Grouse in Wyo.)
1130. 1941. A moonlight episode in parasitology. Abstract. J. Colo.-Wyo. Acad. Sci. 3(2): 58. (collected fecal samples of Sage Grouse on strutting grounds and examined for coccidia)
1131. 1942. Mating behavior of the Sage Grouse. Auk 59: 477-498. (also mentions relationship of Golden Eagle with grouse on strutting ground)
1132. 1944. Life cycle and management of the Sage Grouse. Abstract. J. Colo.-Wyo. Acad. Sci. 3(3-4): 27.

1133. Scott, J. W.  
1945. Mean temperature and mating cycle of the Sage Grouse. Abstract. J. Colo.-Wyo. Acad. Sci. 3(3-4): 45-46.
1134. 1949. A study of the comparative behavior of three species of grouse. Abstract. J. Colo.-Wyo. Acad. Sci. 4(1): 58-59. (Sage, Sharp-tailed grouse and Greater Prairie Chicken)
1135. 1949. A study of the Sharp-tailed Grouse and Greater Prairie Chicken. Abstract. J. Colo.-Wyo. Acad. Sci. 4(1): 59. (behavior of Sharp-tailed Grouse in Wyo.)
1136. 1950. A study of the phylogenetic or comparative behavior of three species of grouse. Annals New York Acad. Sci. 51(Art. 6): 477-498. (Sage Grouse near Laramie, Sharptailed-Grouse near Moorcroft)
1137. 1954. Size variation in Eimeria of the Sage Grouse. Abstract. J. Colo.-Wyo. Acad. Sci. 4(6): 60. (intestinal parasites of Sage Grouse in Wyo.)
1138. Scott, J. W. and R. F. Honess.  
1932. On a serious outbreak of coccidiosis among sage chickens. Abstract. J. Colo.-Wyo. Acad. Sci. 1(5): 87-88.

1139. Scott, O. K.  
1954. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 8: 32-33.
1140. 1954. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 8: 261-262.
1141. 1954. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 8: 322-323. (Red Knot  
at Casper)
1142. 1954. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 8: 354-355. (Bay-breasted  
Warbler at Rawlins)
1143. 1955. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 9: 44-46. (White-winged  
Dove at Casper)
1144. 1955. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 9: 274-275.
1145. 1955. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 9: 347-348.
1146. 1955. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 9: 392-393.
1147. 1956. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 10: 43-44.
1148. 1956. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 10: 270-271.



1149. Scott, O. K.  
1956. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 10: 353-354.
1150. 1956. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 10: 399-401.
1151. 1957. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 11: 45-47. (Buff-breasted  
Sandpiper near Casper)
1152. 1957. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 11: 283-285.
1153. 1957. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 11: 367-368.
1154. 1957. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 11: 421-422.
1155. 1958. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 12: 47-49.
1156. 1958. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 12: 297-298.
1157. 1958. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 12: 373. (Yellow-throated  
Vireo found at Casper)
1158. 1958. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 12: 431-432.
1159. 1959. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 13: 51-53.

1160. Scott, O. K.  
1959. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 13: 311-312.
1161. 1959. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 13: 390-391.
1162. 1959. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 13: 446-447. (Hooded  
Warbler in Laramie, malathion spraying in Casper  
apparently paralyzing Cedar Waxwings)
1163. 1960. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 14: 58-60.
1164. 1960. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 14: 328-329.
1165. 1960. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 14: 409-410.
1166. 1960. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 14: 467-468. (Blue Grosbeak  
just west of Casper)
1167. 1961. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 15: 61-62.
1168. 1961. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 15: 346-348.
1169. 1961. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 15: 428-429. (unusual  
"wave" of migrating warblers in Casper due  
to weather)

1170. Scott, O. K.  
1961. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 15: 483-484.
1171. 1962. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 16: 61-62.
1172. 1962. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 16: 352-353.
1173. 1962. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 16: 435-436. (Worm-eating  
Warbler in Casper)
1174. 1962. Great Basin, central Rocky Mountain region  
Audubon Field Notes 16: 495-496.
1175. 1963. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 17: 53-54. (Parasitic  
Jaeger on Soda Lake near Casper)
1176. 1963. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 17: 345-347.
1177. 1963. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 17: 422-423.
1178. 1963. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 17: 474.
1179. 1964. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 18: 60-61.
1180. 1964. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 18: 374-376.

1181. Scott, O. K.

1964. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 18: 474-476. (Canada  
Warbler in Bates Hole)

1182. 1964. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 18: 526.

1183. 1965. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 19: 63-64.

1184. 1965. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 19: 404-406.

1185. 1965. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 19: 500-501.

1186. 1965. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 19: 567-568.

1187. 1966. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 20: 76-77.

1188. 1966. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 20: 445-446.

1189. 1966. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 20: 535-537. (Summer  
Tanager at Horticultural Station near Cheyenne)

1190. 1966. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 20: 588-589.

1191. 1967. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 21: 62-64.

1192. Scott, O. K.  
1967. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 21: 443-444.
1193. 1967. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 21: 527-528.
1194. 1967. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 21: 590-592.
1195. 1968. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 22: 73-74.
1196. 1968. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 22: 463-465.
1197. 1968. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 22: 560-562.
1198. 1968. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 22: 632-634.
1199. 1969. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 23: 86-87.
1200. 1969. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 23: 503-504.
1201. 1969. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 23: 611-612.
1202. 1969. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 23: 679-680. (Band-tailed  
Pigeon in Grand Teton Natl. Park)

1203. Scott, O. K.  
1970. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 24: 74-75. (Arctic Loon  
at Lake De Smet)
1204. 1970. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 24: 524-526.
1205. 1970. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 24: 628-630.
1206. 1970. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 24: 702-703.
1207. 1971. Great Basin, central Rocky Mountain region.  
Amer. Birds 25: 84-86.
1208. 1971. Great Basin, central Rocky Mountain region,  
Amer. Birds 25: 606-608.
1209. Sebesta, P. D.  
1958. Mammoth. Yellowstone Nature Notes 32(5): 53-54.  
(bull snake attempts to rob Robin's nest)
1210. Selander, R. K.  
1954. A systematic review of the booming nighthawks  
of western North America. Condor 56: 57-79.  
(examined specimens from Wyo.)
1211. Serdiuk, L. J.  
1965. An evaluation of waterfowl habitat at Ocean  
Lake, Wyoming. M. S. Thesis, Univ. Wyo.,  
Laramie. 91 pp.

1212. Serdiuk, L. J.  
1968. Waterfowl for the future. Wyo. Wildl. 32(10):  
14-17. (development of waterfowl habitat on  
Table Mountain Management Unit)
1213. 1970. Managing winter Mallards. Wyo. Wildl. 34(1):  
27-29. (Ocean Lake kept ice-free in winter  
to provide waterfowl habitat)
1214. 1971. Cost and effectiveness of unit farmlands in  
preventing waterfowl depredation on private  
crops. Proc. Western Assoc. State Game & Fish  
Comm. 51: 301-306. (Ocean Lake area)
1215. 1973. 'Tis teal time again. Wyo. Wildl. 37(10): 23,  
34-35.
1216. Serdiuk, L. J. and R. Saul.  
1974. The waterfowl story with fresh perspectives.  
Wyo. Wildl. 38(10): 20-24, 34. (waterfowl  
management and hunting in Wyo.)
1217. Sharp, R. H.  
1955. Wild Turkey observation. Yellowstone Nature  
Notes 29(2): 4. (one seen on east park  
boundary between Middle and Crow creeks, Oct.  
27, 1954)
1218. Sharritt, G. V.  
1946. Home-coming of the elk. Audubon Mag. 48: 348-  
354. (mentions common birds on National Elk  
Refuge, Jackson, and states that at one time  
there were Sharp-tailed Grouse on refuge)

1219. Shiras, G., III.

1909. Camps and cruises of an ornithologist. Natl. Geogr. Mag. 20: 438-463. (review of book of this title by F. M. Chapman 1908, mentions study of Sage Grouse in Wyo.)

1220. 1913. Wild animals that took their own pictures by day and by night. Natl. Geogr. Mag. 24: 763-834. (photo of White Pelicans on Yellowstone Lake)

1221. Shoemaker, C. D.

1940. Trumpeter Swan comes back. Wyo. Wild Life 5(12): 16. (pair on Jackson Lake in 1930)

1222. Short, L. L.

1965. Hybridization in the flickers (Colaptes) of North America. Bull. Amer. Mus. Nat. Hist. 129: 307-428. (the zone of hybridization between Red-shafted and Yellow-shafted flickers extends into eastern Wyo.)

1223. Shufeldt, R. W.

1881. Behavior of Leucosticte tephrocotis in confinement. Bull. Nuttall Ornith. Club 6: 177-178. (Gray-crowned Rosy Finches confined at Fort Fetterman, Converse Co., failed to breed)

1224. 1882. Note on Mimus polyglottus. Bull. Nuttall Ornith. Club 7: 180. (pair of Mockingbirds nested near Fort Fetterman in 1879, 1880)



1225. Shufeldt, R. W.  
1891. A long-ago visit to Lake De Smet. Amer. Field  
35: 299-300. (mentions various birds, not seen,  
cited in Auk 9: 384)
1226. Sibley, C. G. and L. L. Short, Jr.  
1959. Hybridization in the buntings (Passerina) of the  
Great Plains. Auk 76: 443-463. (the zone of  
hybridization between the Lazuli and Indigo  
buntings extends into eastern Wyo.)
1227. Simon, F.  
1940. The parasites of the Sage Grouse. Univ. Wyo.  
Publ. 7: 77-100.
1228. Simon, J. R.  
1940. Mating performance of the Sage Grouse. Auk 57:  
467-471.
1229. 1940. Save the ducks. Wyo. Wild Life 5(11): 1-2.  
(botulism in ducks at Ocean Lake, Fremont Co.)
1230. 1952. First flight of Trumpeter Swans, Cygnus  
buccinator. Auk 69: 462. (Grand Teton Natl. Park)
1231. Simonian, S.  
1953. Rufous Hummingbirds (Selasphorus rufus).  
Yellowstone Nature Notes 27(5): 52-53.  
(in Old Faithful area)
1232. Simpson, J. G.  
1938. A Wyoming winter visitor. Wyo. Wild Life 3(1):  
no page nos. (Rough-legged Hawk)

1233. Skinner, C. K.  
1948. Winter observations of Trumpeter Swans.  
Yellowstone Nature Notes 22(2): 17.
1234. Skinner, M. P.  
1916. The nutcrackers of Yellowstone Park. Condor  
18: 62-64. (Clark's Nutcracker)
1235. 1917. Some birds of the Yellowstone. J. Amer. Mus.  
Nat. Hist. 17: 129-134.
1236. 1917. The Ospreys of the Yellowstone. Condor 19:  
117-121.
1237. 1917. The birds of Molly Island, Yellowstone National  
Park. Condor 19: 177-182. (White Pelican, Caspian  
Tern, California and Ring-billed gulls)
1238. 1920. Trumpeter Swan breeding in Yellowstone Park.  
Condor 22: 72.
1239. 1920. The Pink-sided Junco. Condor 22: 165-168.  
(natural history of Dark-eyed Junco in Yellowstone  
Natl. Park)
1240. 1920. The balance of nature. Sat. Evening Post  
192(Jan. 3): 59. (White Pelicans and trout  
in Yellowstone Natl. Park)
1241. 1921. Notes on the Rocky Mountain Jay in the  
Yellowstone National Park. Condor 23: 147-151.  
(Gray Jay)
1242. 1922. Notes on the Dipper in Yellowstone National  
Park. Condor 24: 18-21.

1243. Skinner, M. P.  
1923. Additions to the list of birds from Yellowstone Park. Condor 25: 28. (Bobolink, Ruddy Turnstone, White-faced Ibis)
1244. 1923. Feeding habits of the Rocky Mountain Hairy Woodpecker. Condor 25: 32. (in Yellowstone)
1245. 1924. The Yellowstone nature book. A. C. McClurg and Co., Chicago. (chapter on birds)
1246. 1925. The birds of the Yellowstone Park. Roosevelt Wild Life Bull. 3: 1-192. (guide to bird finding and an annotated list of approximately 200 species)
1247. 1926. Wood Ibis in the Yellowstone National Park. Condor 28: 99. (one seen near Grand Canyon of Yellowstone, July 16, 1925)
1248. 1927. New additions to the Yellowstone Park list of birds. Condor 29: 203-204. (Black-bellied Plover, Varied Thrush, White-tailed Ptarmigan)
1249. 1927. Richardson's Grouse in the Yellowstone Park. Wilson Bull. 39: 208-214. (includes bibliography of references to Blue Grouse in park)
1250. 1928. Kingfisher and Sharp-shinned Hawk. Auk 45: 100-101. (in Yellowstone Natl. Park)
1251. 1928. Yellowstone's winter birds. Condor 30: 237-242.
1252. 1928. The Canada Goose in Yellowstone National Park. Wilson Bull. 40: 139-149.

1253. Skinner, M. P.  
1929. Double-crested Cormorant in Yellowstone National Park. Condor 31: 128.
1254. 1931. Belted Kingfishers wintering in the Yellowstone National Park. Auk 48: 601.
1255. 1937. Barrow's Golden-eye in the Yellowstone National Park. Wilson Bull. 49: 1-10. (includes bibliography of articles referring to species in park)
1256. Sloan, N. F.  
1973. Status of breeding colonies of White Pelicans in the United States through 1972. Inland Bird Banding News 45: 83-96. (includes data on Yellowstone Park colony)
1257. Smith, D. J.  
1962. Waterfowl status report, 1962. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.--Wildl. No. 68. iv + 127 pp. (Wyo. breeding ground and winter surveys, harvest data)
1258. Smith, G. A.  
1932. A Spotted Sandpiper incubates five eggs. Wilson Bull. 44: 38. (in Yellowstone Park)
1259. Smith, H. M.  
1920. Some biological problems in the Yellowstone Park. Abstract. J. Wash. Acad. Sci. 10: 583-585.  
(White Pelican-cutthroat trout-parasite relations)

1260. Smith, H. M.  
1950. Experimental modification of the breeding cycle in the Yellow-headed Blackbird (Xanthocephalus xanthocephalus). Abstract. J. Colo.-Wyo. Acad. Sci. 4(2): 72. (near Laramie)
1261. Smith, J. and F. Kenney.  
1950. Wild Turkeys survive the storm. Wyo. Wild Life 13(5): 10-13, 38-39.
1262. Smith, J. E. and K. L. Diem.  
1969. Growth and development of young California Gulls (Larus californicus). Abstract. J. Colo.-Wyo. Acad. Sci. 6(2): 53. (young gulls at Bamforth Lake colony, Albany Co.)
1263. 1971. Incidence of deformed bills in California Gulls (Larus californicus). Auk 88: 435. (data from Bamforth Lake colony, Albany Co.)
1264. 1972. Growth and development of young California Gulls (Larus californicus). Condor 74: 462-470. (young gulls at Bamforth Lake colony)
1265. Smith, W. G.  
1888. Breeding habits of the Mountain Plover. Ornithologist and Oologist 13(12): 187-188. (found one nest on Laramie Plains)
1266. Snyder, H. N.  
1940. The wild Turkey. Wyo. Wild Life 5(2): 3. (Laramie Range)

1267. Sperry, C. C.

1941. Food habits of the coyote. U. S. Dept. Int.,  
Fish & Wildl. Serv., Wildl. Res. Bull. No. 4.  
70 pp. (bird remains in stomachs of coyotes  
collected in Wyo.)

1268. Spofford, W. R.

1969. Brief reports of the Golden Eagle in North America,  
pp. 345-347. In J. J. Hickey (ed.), Peregrine  
Falcon populations, their biology and decline.  
Univ. Wisconsin Press, Madison. (p. 346 "In  
Wyoming, as many as 40 eagles in an hour have  
been counted along a flyway in early November")

1269. Squires, W. A.

1929. Yellowstone National Park and the conservation  
of our native birds. Bird Lore 31: 188.  
(mentions value of park as a preserve for rare  
birds, especially Trumpeter Swans)

1270. Stevens, T.

1954. The clean nest. Yellowstone Nature Notes  
28(5): 58. (young Osprey eject excreta over  
edge of nest)

## 1271. Stevenson, J.

1871. A list of mammals and birds collected in Wyoming Territory, by Mr. H. D. Smith and Mr. James Stevenson, during the expedition of 1870, pp. 461-466. In F. V. Hayden, Preliminary report of the United States geological survey of Wyoming and portions of contiguous territories. 42nd Congr., 2nd Sess., House Exec. Doc. 325. (they collected birds in southern one-third of Wyo.)

## 1272. Stevenson, J.

1934. Comments upon systematics of Pacific coast jays of the genus Cyanocitta. Condor 36: 72-78.  
(range of Steller's Jay in Wyo.)

## 1273. Stewart, D. C.

1955. The case of the racing Raven. Yellowstone Nature Notes 29(3): 28-29. (Raven following road clocked at 25-30 mph)

## 1274. Stewart, R. E.

1944. Food habits of Blue Grouse. Condor 46: 112-120.  
(lists stomach contents of grouse collected in Wyo.)

## 1275. Stewart, R. E. and J. W. Aldrich.

1956. Distinction of maritime and prairie populations of Blue-winged Teal. Proc. Biol. Soc. Wash. 69: 29-36. (specimens from Wyo. identified as Anas discors discors)

1276. Stewart, R. E., A. D. Geis and C. D. Evans.  
1958. Distribution of populations and hunting kill of the Canvasback. J. Wildl. Mgmt. 22(4): 333-370.
1277. Stone, W.  
1899. Some Philadelphia ornithological collections and collectors, 1784-1850. Auk 16: 166-177.  
(the types of the Mountain Plover and Sage Thrasher collected by J. K. Townsend in Wyo. in 1834 are in this collection)
1278. 1899. A study of the type specimens of birds in the collection of the Academy of Natural Sciences of Philadelphia, with a brief history of the collection. Proc. Acad. Nat. Sci. Phila. 51: 5-62. (see preceeding annotation)
1279. 1936. On the types of J. K. Townsend's birds. Auk 53: 242. (describes circumstances surrounding publication of Townsend's 1837 paper)
1280. Suchetet, A.  
1897. Des hybrides à l'état sauvage. Règne animal. Classe des oiseaux. Librairie J.-B. Baillière et Fils, Paris. (quotes Robert Ridgway on a supposed hybrid chickadee collected in Wyo., see Banks 1970)
1281. Sugden, J. W.  
1938. The status of the Sandhill Crane in Utah and southern Idaho. Condor 40: 18-22. (mentions breeding population in northwest Wyo.)



1282. Sura, G.  
1966. Aqua roundup. Wyo. Wildl. 30(9): 13-17. (photo essay on Canada Goose banding at Ocean Lake)
1283. Swales, B. H.  
1919. Stilt Sandpiper (Micropalama himantopus) in Wyoming. Auk 36: 102. (4 specimens collected near Fort Laramie)
1284. Sweetman, L. C.  
1936. Young Bald Eagles nesting near Fishing Bridge. Yellowstone Nature Notes 13(5-6): 31.
1285. Swenk, M. H.  
1916. The Eskimo Curlew and its disappearance, pp. 325-340. In Annual report of the Smithsonian Institution for 1915. U. S. Govt. Printing Office. (about 1897 a flock of Eskimo Curlews was seen near Laramie in late spring)
1286. 1930. The crown sparrows (Zonotrichia) of the middle west. Wilson Bull. 42: 81-97. (White-crowned Sparrow in Wyo.)
1287. Swenk, M. H. and O. A. Stevens.  
1929. Harris' Sparrow and the study of it by trapping. Wilson Bull. 41: 129-177. (notes 2 specimens mentioned by Knight 1902 from Converse Co.)

1288. Swenson, J. E.  
1975. Ecology of the Bald Eagle and Osprey in  
Yellowstone National Park. M. S. Thesis,  
Montana State Univ., Bozeman. 146 pp.
1289. Test, F. H.  
1941. Another summer record of the Great Gray Owl in  
Yellowstone National Park. Condor 43: 160-161.
1290. Thompson, B. H.  
1931. A pond at dusk. Amer. Forests 37: 519. (photo  
of Wood Ibis in Yellowstone Natl. Park)
1291. 1932. History and present status of the breeding colonies  
of the White Pelican (Pelecanus erythrorhynchos)  
in the United States. U. S. Dept. Int., Natl.  
Park Serv., Contr. Wild Life Div., Occas. Paper  
No. 1. 96 pp. (mentions Yellowstone colony)
1292. 1934. A wilderness-use technique. Condor 36: 153-  
157. (conflict between development and preser-  
vation in Yellowstone Natl. Park, describes  
bird life around a small pond)
1293. 1936. The problem of vanishing species--the Trumpeter  
Swan. Proc. N. Amer. Wildl. Conf. 1: 639-641.  
(status of species in Yellowstone Natl. Park)
1294. Thorne, O.  
1950. Fourteenth breeding-bird census. Audubon Field  
Notes 4: 301-302. (cottonwood-willow riverbottom  
community on Shoshone River, lists 21 species  
including Black-chinned Hummingbird)

1295. Todd, J. W.

1974. Northern grassland, p. 1029. In W. T. Van Velzen (ed.), Thirty-eighth breeding bird census. Amer. Birds 28: 987-1054. (Campbell Co.)

1296. 1974. Sagebrush steppe, p. 1044. In W. T. Van Velzen (ed.), Thirty-eighth breeding bird census. Amer. Birds 28: 987-1054. (Campbell Co.)

1297. Tomlinson, R. E.

1965. Mourning Dove status report, 1965. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.-- Wildl. No. 91. iv + 37 pp. (summary of Wyo. call-count data for 1964, 1965, trends in breeding population index 1958-1965)

1298. Townsend, J. K.

1837. Description of twelve new species of birds, chiefly from the vicinity of the Columbia River. J. Acad. Nat. Sci. Phila. 7: 187-193. (description of two new species from Wyo.: the Mountain Plover and Sage Thrasher; see also Stone 1899, 1936 and Coues 1900)

1299. 1839. List of the birds inhabiting the region of the Rocky Mountains, the territory of the Oregon, and the north west coast of America. J. Acad. Nat. Sci. Phila. 8: 151-158. (list with no specific locations given)

1300. Townsend, J. K.

1839. Narrative of a journey across the Rocky Mountains, to the Columbia River, and a visit to the Sandwich Islands, Chili, & c., with a scientific appendix. Henry Perkins, Philadelphia. (describes birds encountered along Oregon Trail in Wyo. in 1834; reprinted in R. G. Thwaites, Early Western Travels, 1748-1846, Vol. 21. Arthur H. Clark Co., Cleveland, Ohio)

1301. Transit.

1879. The flesh of the Sage Grouse. Forest and Stream 12: 85. (letter to editor in which writer mentions abundance of Sage Grouse in Red Desert)

1302. Turner, J. F.

1971. Eagles over Wyoming. Wyo. Wildl. 35(9): 8-13, 34. (Bald and Golden eagles)

1303. Twining, F. S.

1931. Bird-watching in the West. Metropolitan Press, Portland, Oregon. (supplement includes a checklist of birds of Yellowstone Natl. Park by D. G. Yeager, Park Naturalist)

1304. Tyers, J. A.

1956. Nature's largest owl. Yellowstone Nature Notes 30(5): 46-47. (Great Gray Owl)

1305. Van den Akker, J. B.  
1949. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 3: 178-180.
1306. Van den Akker, J. B. and V. T. Wilson.  
1949. Great Basin, central Rocky Mountain region.  
Audubon Field Notes 3: 217-218.
1307. Verbeek, N. A. M.  
1967. Breeding biology and ecology of the Horned Lark  
in alpine tundra. Wilson Bull. 79: 208-218.  
(on Beartooth Plateau of northwest Wyo. and  
adjoining Montana)
1308. 1970. Breeding ecology of the Water Pipit. Auk 87:  
425-451. (on Beartooth Plateau of northwest Wyo.  
and adjoining Montana)
1309. 1973. Pterylosis and timing of molt of the Water  
Pipit. Condor 75: 287-292. (pattern of molt  
determined from adult, breeding birds collected  
on the Beartooth Plateau)
1310. Vogler, J.  
1974. Threatened wildlife. Wyo. Wildl. 38(6): 29-30.  
(mention Peregrine Falcon, Osprey, Bald Eagle,  
Gyr Falcon, Trumpeter Swan, Snowy Owl, Burrowing  
Owl, Columbian Sharp-tailed Grouse)
1311. Wagner, R.  
1963. Banding the Canada. Wyo. Wildl. 27(9): 29-33.  
(photo essay on banding Canada Geese)

1312. Wagner, R.  
1964. Pheasants galore. Wyo. Wildl. 28(8): 5-9.
1313. Walcott, F. C.  
1931. Trumpeter Swans. Trumpeter Swan cygnets. Bird Lore 33: 316-317. (two photos taken in Wyo.)
1314. Walkinshaw, L. H.  
1949. The Sandhill Cranes. Granbrook Inst. Sci., Bull. 29. (nesting of species in northwest Wyo.)
1315. 1973. Cranes of the world. Winchester Press, New York. (discusses Sandhill Cranes in Wyo.)
1316. Wallace, G. J.  
1955. An introduction to ornithology. The MacMillan Co., New York. (Trumpeter Swan nesting in Yellowstone Natl. Park)
1317. Wanlass, W. C. and L. F. Wanlass.  
1955. Observations of a Trumpeter Swan family on "Madison Junction Lake"--1953-1954 seasons. Yellowstone Nature Notes 29(1): 6-7.
1318. Ward, B.  
1968. Wyoming's ground nesting hawks. Wyo. Wildl. 32(4): 15-17. (Ferruginous Hawk)
1319. Ward, C. E.  
1952. The Mourning Dove in Wyoming. Wyo. Wild Life 16(4): 34-35.

1320. Ward, C. E.

1955. The Goshen pheasant . . . . Wyo. Wild Life  
19(11): 18-21. (Ring-necked Pheasant first  
introduced in Goshen Co. in early 1900's)

1321. Ward, H. B.

1924. Banding White Pelicans. Condor 26: 136-140.  
(Yellowstone Lake colony)

1322. Watkins, R. and W. Replogle.

1937. Osprey: the fisherman. Yellowstone Nature Notes  
14(11-12): 50-51.

1323. Watson, W. V.

1949. Trumpeter Swan kills muskrat. Yellowstone Nature  
Notes 23(5): 49-50.

1324. Webster, J. D.

1967. Lodgepole pine--spruce forest. Audubon Field  
Notes 21: 622. (breeding bird census in Bridger  
Wilderness)

1325. Weeden, R. B.

1967. Seasonal and geographic variation in the foods  
of adult White-tailed Ptarmigan. Condor 69:  
303-309. (information on crop contents of birds  
collected on Snowy Range in 1911)

1326. Weller, M. W.

1964. Distribution and migration of the Redhead. J.  
Wildl. Mgmt. 28: 64-103.

1327. Wells, G. R.  
1936. Our wild bird situation. Wyo. Wildl. 1(11):  
no page nos.
1328. 1941. [Methods of Chukar propagation]. Wyo. Wild Life  
6(1): 3, 14.
1329. 1944. 1943 game-bird plant reduced. Wyo. Wild Life  
9(3): 23.
1330. 1952. Wyoming Chukar Partridge transplanting experiences.  
Proc. Western Assoc. State Game & Fish Comm. 32:  
168-170.
1331. Wheeler, O. D.  
1893. Wonderland, 1893. Northern Pacific Railroad,  
St. Paul, Minnesota. (earliest report of dead  
birds found at Stygian Cave, Yellowstone Park)
1332. White, C. M. and W. H. Behle.  
1960. Birds of Flaming Gorge reservoir basin, pp. 185-  
208. In Ecological studies of the flora and  
fauna of Flaming Gorge reservoir basin, Utah  
and Wyoming. Univ. Utah, Dept. Anthropology,  
Anthropological Paper No. 48. (survey made  
before water backed up behind dam, lists 155  
species from Daggett Co., Utah, and Sweetwater  
Co., Wyo.)
1333. Whitlock, B. T.  
1958. Shooting Magpies. Wyo. Wild Life 22(6): 16-17.



1334. Wiens, J. A.

1974. Climatic instability and the "ecological saturation" of bird communities in North American grasslands. Condor 76: 385-400. (includes data from one study area in shortgrass prairie in southeast Wyo.)

1335. Wight, H. M.

1962. Mourning Dove status report, 1962. U. S. Dept. Int., Fish & Wildl. Serv., Spec. Sci. Rep.-- Wildl. No. 70. iv + 33 pp. (summary of Wyo. call-counts for 1961, 1962; trends in breeding population index 1953-1962)

1336. Wight, H. M., E. B. Baysinger and R. E. Tomlinson.

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(Ferruginous Hawk)
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(Bald Eagle)
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(Gyr Falcon)
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the author listed a total of 109 species)
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Fork, Utah, not Henry's Fork, Wyo.)

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The numbers listed after each area refer to numbered references in the bibliography. Most of the cited references are annotated lists or habitat studies. Papers on individual species are not listed.

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Various aspects of peregrine falcon (*Falco peregrinus*) life history and ecology are examined for populations of western North America. Bond hypothesizes on possible factors influencing population densities. He also offers recommendations to guarantee protection of these birds in the west.

Nesting Canada geese (*Branta canadensis*) were surveyed in the spring of 1947. The survey was located along a 40 mile stretch of the Snake River in Jackson Hole, Wyoming. Nests were most often located on gravel bars and islands. Vegetation on these sites was a scanty cover of willow and cottonwood saplings.

Initial egg laying took place on April 1-3. The peak of incubation was on April 18-23. The peak of hatch was on May 16-21. Nest densities were as high as 8 along a one mile stretch of river, but averaged two nests per mile of river. All locations had enough soil or finely broken drift material to enable the geese to scoop out a shallow saucer-like hollow. Nests were in or near scanty clumps of willow and grass vegetation. The average height of 43 nests above the low water mark was 34.5 inches or roughly three feet. Observations indicated that this same density (an average of 2.2 pairs per mile) of nesting geese extended up the Snake River into Yellowstone Park as well as down the river for an undetermined distance. The broods varied from one to seven with an average of 4.5 goslings. Eighty-eight pairs of nesting geese produced 106 goslings, or 1.2 goslings per pair, or less than one per adult. Some of the principal mortality factors which brought about this discrepancy between actual and potential productivity were flooding, predation, and unfavorable weather conditions combined with the first two factors.

Information on nest successes and failures was as follows:

Successful nests	21
Destroyed by ravens	13
Destroyed by flooding	9
Unknown destruction	45

Intensive investigations into the raptors of a 12-square mile semi-wilderness area at Moose, Wyoming is accomplished in this study. Ten raptor species, 3 owls and 7 hawks were found on the study area. Some of the dominant topics discussed include population composition and density, population stability, range of hawks during their nesting periods, foods of raptors during the nesting season, and the function of raptor predation.

A few of the conclusive findings regarding density and predation follow:

The area supported 45 nesting pairs of raptors in 1947 and a comparable population density and composition in 1948. There were 3.8 pairs of nesting raptors per square mile. All raptors studied exhibited strong tendencies to reoccupy nesting territories or ranges in consecutive years. On a large land area the raptor population shows the

same continuity of occupancy that is exhibited by the individual nesting pairs. In the Wyoming study area the nesting pattern remained at least 75 percent intact from one breeding season through the next. The nesting success was 83 percent. Raptor population density at the close of the breeding season rose to 17.4 birds per square mile. The average raptor density for the entire year was 8.7 birds per square mile. Man was directly and indirectly responsible for nearly half the raptor nest destruction. An analysis of predation during the breeding season of hawks and owls showed that, as in winter, predation by a collective raptor population was roughly proportional to relative prey densities.

## 550

A study was made in the Woubay Waterfowl Study Area in northeastern South Dakota of blue-winged teal. The study concentrated on type I potholes during the spring of 1965 and 1966 and the summers of 1964 and 1965.

Seventy and 26 percent of the potholes, on the 3.45 study area in the northern prairie hills, has seasonally flooded basins and shallow wetlands, respectively. The study area flora was weed-grass prairie. Potholes supported a variety of water-tolerant, emergent and submergent plants.

Pair densities were 30.7 and 33.0 per square mile in 1965 and 1966, and were near the maximum due to favorable water conditions. Home ranges averaged 160 acres, ranging from 74 to 215 acres. Centers of activity averaged 24 acres, and ranged from 10 to 39 acres.

## 562

Along the lake shore at West Thumb osprey (Pandion haliaetus) have built nests on the stumps of dead pines. In most cases the nests are on the summit of the stump 25 to 30 feet above the ground. In a few cases the nests were built in the crotch of a limb. In the Grand Canyon the nests are built on the summits of towering crags.

## 587

A study of certain ecological aspects of bird populations in four open areas in southeastern Wyoming was carried out from the summer of 1958 through the summer of 1960. This study is concerned with bird populations which occur in southeastern Wyoming on treeless or relatively treeless areas. These include the Laramie Basin, the Medicine Bow Mountains, the Laramie Mountains, and the Great Plains. One study area was located in each of these physiographic types.

On each of the four areas two 20-acre plots were staked out in acre blocks. Bird censuses were conducted on all four areas by use of a plot census method. Qualitative and quantitative comparisons indicated that the vegetation of the two plains areas was most alike. Libby Flats was the most dissimilar of the four areas. Bird populations were considered in terms of pre-breeding, breeding, post--breeding, and winter seasons, with main emphasis being placed on the species of birds that were residents on the four areas.

(587)

Estimates of average densities in pairs per 100 acres during the breeding season were as follows: Cheyenne, 106.5; Laramie, 70.8; Pole Mountain, 22.1; Libby Flats, 16.0. The horned lark (Eremophila alpestris) was the only species that nested on all four areas and was also the most numerous breeding bird on all areas except Libby Flats. McCown's longspur (Rhynchophanes mccownii) and the mountain plover (Eupoda montana) were the only other breeding birds on the Cheyenne and Laramie areas.

Correlation coefficients were determined between major bird species, plant frequency, crown cover, basal cover, growth form, and total height of the vegetation. Birds on the two plains areas showed no significant correlations with the qualities of the vegetation measured. On Pole Mountain, horned larks preferred sparse vegetation; vesper sparrows (Poocetes gramineus) preferred big sagebrush (Artemisia tridentata) or big sagebrush and quaking aspen (Populus tremuloides); white-crowned sparrows (Zonotrichia leucophrys), robins (Turdus migratorius) and Brewer's blackbirds (Euphagus cyanocephalus) preferred the quaking aspen groves. White-crowned sparrows on Libby Flats showed a preference for krummholz.

589

See abstract number 587.

615

The nests were in a narrow strip of rushes, growing in water 18 inches deep, and about 130 feet from the shore; between the rushes and the shore was a heavy growth of coarse, marsh grass, the whole covering not over one to one and one-half acres in area. Build floating nest with outer rim 2-3 inches above water. Eggs may contact water.

637

There seems to be no limit of altitude above which the bird will not nest in the western United States providing a suitable nesting situation can be found. Being a hole-nesting bird that normally seeks cavities in trees, the species would not be expected to breed above timberline, but lack of nesting cavities seems to be the only deterrent. In the area studied (SW Wyo.) the feeding ground was always in sagebrush.

704

All literature on North American grouse and quail published prior to 1973 is summarized in this book. Data on weights and measurements, life history, habitat preferences, population dynamics and management practices are presented by species.

755

Observations of bird life were summarized for the region. Relative abundance, rare observations, and unusual situations concerning avifauna were reported in a popularized fashion.

758

Observations of bird life were summarized for the region. Relative abundance, rare observations, and unusual situations concerning avifauna were reported in a popularized fashion.

878

The summer range of Leucosticte atrata and consequently, its breeding ground, is known to include the alpine areas of the Wind River, Teton, and Absaroka mountains in north-western Wyoming. From observation and the examination of the stomach contents in the field, the diet during the spring and early summer seems to be largely of a vegetable nature. Examination showed their throats and gullets crammed with small moisture-softened seeds and bits of newly sprouted plants. Nesting sites are found in the sides of cliffs. Miller described the area where he found nests as an almost unbroken rim of nearly perpendicular cliffs several hundred feet high, a steep slope of slide rock dropping below them to the floor of the valley.

916

The Virginia rail (Rallus limicola) is common on the Wheatland Flats in practically every marsh that is wet enough to grow cattails, cress, and marsh grasses. Virginia rail builds its nest in thick bunches of marsh grass over shallow water. The sora rail (Porzana carolina) nests in the rushes over water 6 inches to 2 feet deep.

917

Blue grouse (Dendragapus obscurus) - During the spring season the bird were found feeding chiefly on pine needles, supplemented with other vegetable growth from among the aspen copses. During the fall it appeared to be feeding on pine needles, largely supplemented with partridge berries.

Clark nutcracker (Nucifraga columbiana) - In the fall these birds were feeding in the tops of the pines.

Audubon warbler (Dendroica auduboni) - In the spring this species was seen occasionally in pine timber. They seemed to be feeding about the new growth of needles at the tips of the branches.

Broad-tailed hummingbird (Selasphorus platycercus) - Seen along water courses where there was plenty of willow growth, and where there were steep hillsides nearby more or less covered with pine.

1103

Wyoming's avifauna was analyzed in seven different vegetative communities. Avifauna indices available for each of these communities include: (1) mean number per count, (2) number per 100 acres, (3) mean weight, grams, (4) standing crop biomass, grams per 100 acres, and (5) consuming biomass, grams per 100 acres. The communities analyzed were lodgepole, lodgepole-spruce-fir, spruce-fir, willow-sedge swamp, scrub-meadow, flatland aspen, and hillside aspen. There are at least 40 species of bird mentioned in the tables and text.

1234

Clark nutcrackers move up and down the mountains at the change of the seasons. In summer they are at all elevations, but in winter they are all below 7,000 feet. Nutcrackers (Nucifraga columbiana) will eat anything, but seem to prefer pine seeds, especially those from pinyon pine (Pinus edulis). Nutcrackers do not restrict themselves to the troubles of their own species. They were observed fighting with mountain bluebirds (Sialia currucoides) and also will attack western red-tail hawks (Buteo jamaicensis) and Swainson hawks (Buteo swainsoni). Nests are built in the thick top of a cedar, or other evergreen, in a convenient crotch about 12 feet above the ground.

1236

Osprey (Pandion haliaetus) abundance is due to the large quantities of easily obtainable fish as much as to the absolute protection afforded by the Park. Stocking of trout in formerly barren streams has encouraged ospreys to expand their nesting areas. Undoubtedly the normal nesting site of an osprey is the tip of a tall spruce, pine, or fir on or near the waters edge. In certain canyons, the ospreys have chosen to build their homes on the tips of sheer, out-jutting pinnacles of rock whose tips are completely covered by the nest. Some nests can be a mile or more from water.

1237

The pelican (Pelecanus erythrorhynchos) requires peculiar conditions for his home. First, there must be an inexhaustible supply of fish. Kind of fish doesn't seem to matter. Second, as the bird cannot walk well the nest must be near the water. Third, the nest must be low to afford easy access to the water, in which the young swim long before they can fly. Fourth, the parents and the young are white, and such conspicuous prey must be protected from terrestrial prowlers by the isolation of an island. Fifth and most important, the island must be remote to afford privacy. Hence, breeding pelicans are restricted to large bodies of water remote (or protected) from man, and containing low-lying islands.

1241

Rocky Mountain jay - Forests of lodgepole pine, limber pine, fir, spruce, cedar, and even aspen groves and willow thickets constitute their chosen haunts. Their nests are in the lodgepole pine belt between the 7,500 and 8,000 foot levels.

1251

## Birds General

Hot water flowing into rivers and streams from geysers and hot springs play an important role in allowing birds to winter in the Park.

There are some indications that a few of the Richardson grouse (Blue Grouse) (Dendragapus obscurus) are higher in winter than in summer.

Black-billed magpies (Pica pica) are found as high as 8,000 feet during winter, but drop below 5,000 feet to breed.

Generally, tells about birds seen in Yellowstone during the winter.

1281

Sandhill crane - Many of the valleys of the headwaters of the tributaries of the Snake River, both in Idaho and Wyoming, are known to support breeding sandhill cranes. Typical breeding grounds are the open grassy or rush-covered valleys in the remote ranges. The nests are placed in the shallow ponds or soggy meadows fed by the reservoir of melting snow. They may be placed in open water, among the rushes, grasses or other vegetation of shallow ponds, or even on the ground of stream banks. Large rounded piles of rushes, vegetation and debris, and algae from the bottom of the pond, make up the nesting structure. If in a wet site, the nest is large enough to keep the eggs in the shallow depression in the top out of the water. If on higher and drier land, it may be a mat of sticks, grass or stems about 3 feet in diameter and only a few inches thick. Apparently anything at hand is acceptable as nest material.

1337

One of the redhead migration routes to the wintering grounds on the Texas coast follows the Bear River into Idaho and Wyoming; across Wyoming to the Pathfinder and Seminole Reservoirs and reservoirs near Laramie; then out the state.

1393

Approximately 78,000 square miles of eagle winter habitat was sampled by aerial surveys during the month of January to determine numbers and relative density of bald and Golden eagles wintering in this state.

Results of the survey indicated an estimated 4,549 adult and 1,834 immature golden eagles. It was further calculated that there were 2,694 golden eagles of questionable age. The survey gave an estimate of 608 adult and 79 immature bald eagles within the confines of the state. An estimated 897 eagles of unknown species were also adjudged to be within the survey area. The total estimated eagle population for Wyoming, excluding Yellowstone National Park and several high mountain areas, is 10,661.



1411

Dietary studies were continued on insectivorous and granivorous birds of the short-grass prairie as found at the Pawnee Site. Stomach samples were obtained for 23 species of grassland birds. All birds so far examined feeding at the Pawnee Site are utilizing approximately 125 genera of seeds for food.

Field studies of the interrelationships of four species of grassland passerines, lark buntings (Calamospiza melanocorys), McCown's longspurs (Rhynchophanes mccownii), chestnut-collared longspurs (Calcarius ornatus), and horned larks (Eremophila alpestris), were made during the spring and summer of 1971. Investigations were initiated to evaluate temporal segregations of ecological demands of these species on the ecosystem, and spatial distribution and vegetational preference shown by these species.

1414

A breeding bird survey was run southwest of Colorado Springs, Colorado. The plots were approximate squares of 70 acres. Nine traverses through the plots were made beginning in early May and extending through July.

The total number of species observed were 17. Eighty territorial males or females equal to 114 per 100 acres were observed.

1415

Cottonwood habitat is relatively scarce in Colorado and becoming scarcer. This article reviews and synthesizes the previous published research on cottonwood habitat. Cottonwood habitat was compared to other habitat types in Colorado. These comparisons are on quantity of habitat available, total species diversity, and total species density. Both summer and winter statistics are compared. Cottonwoods were found to have an average of 17.8 summer and 19.2 winter species present. Average densities were 797 and 620 per kilometer square during summer and winter respectively. Bottorff continues to state the necessity of deterring cottonwood habitat destruction.

1416

A shortgrass prairie complex was surveyed for breeding birds. The plot was located eight miles NNW of Nunn, Colorado, on the Pawnee National Grasslands. The plot was 100 acres. Three species and 46.5 territorial males were observed on the site. Territorial males were calculated to equal 47 per 100 acres.

1418

Snags, old-growth forests, and riparian habitat are unique components of forest ecosystems. Their value, characteristics, and management as they relate to nongame birds are discussed.

Specific habitat components required by cavity nesting birds were defined. Territory size of cavity nesters was also reported.

1423

A breeding bird survey was run in a ponderosa pine stand near Boulder, Colo. The study plot was 17.2 acres in size and located at 6,000 feet elevation. Avian density was 174 pairs/per 100 acres for 17 breeding species. Six species contributed 53 percent of the breeding pairs. Differences in feeding ecology were found to reduce intraspecific competition.

1424

Burned areas usually had more bird species and greater densities than clearcut areas. Forested controls had fewer species than clearcut plots. The number of bird species was negatively correlated with the frequency of dwarf huckleberry and the frequency of shrubs. The number of bird species was positively related to the frequency of C. brevipes, the frequency of all forbs, the frequency of all grasses, and the number of plant species present. Burned plots had more guilds than either clearcut or forested plots, and clearcut plots usually had more than forested plots.

The standing dead timber present in the burned plots (Table 11) adds a component to the habitat that is not present in the Snowy Range clearcut. The Sierra Madre clearcut has some standing dead timber, and has the same number of guilds and species as the burned plots.

Since most of the birds present in all the plots were ground-brush feeders (Fig. 6), a wide variety of food types is desirable to support a wide variety of bird species. Neither the Snowy Range control or clearcut meets this requirement. The Sierra Madre control consisted of a lodgepole pine overstory and an understory of spruce and fir (Tables 15 and 8). In addition, it had a wider variety of plant species than the Snowy Range control (Table 7). As a result of these factors the Sierra Madre control was able to support more bird species and guilds than its counterpart in the Snowy Range.

1429

Birds of the shortgrass prairie of northcentral Colorado were studied during 1969-70 to determine species, number, standing crop biomass, and population fluctuations on the Central Plains Experimental Range. Two systems of counts were used: a roadside count, and a census of six, 20-acre plots, which were used to determine the effects of grazing by cattle on the distribution of birds. Total populations, breeding-pair populations, standing crop biomass, and bird-use days were determined for two seasons, a post-breeding season, and winter. The breeding population (65.5 and 48.4 pairs/100 acres in 1969 and 1970, respectively) was composed of eight species of which five provided 95% of all nesting. Horned larks (Eremophila alpestris) and lark buntings (Calamospiza melanocorys) were the most abundant nesters. Horned larks and McCown's longspur (Rhynchophanes mccownii) were the primary post-breeding species. Horned larks and Lapland longspur (Calcarius lapponicus) were the primary winter species. Plots heavily grazed by cattle received the greatest use by birds for nesting and foraging; lightly-grazed plots received the least use. The composition of populations using each plot varied considerably in numbers and species. Conclusions about the avifauna of the prairie are offered.



## 1431

The bird populations of pygmy conifers near Price, Utah were studied. The vegetation was that of an arid juniper/pinon complex. The sub-dominant species inhabiting this community included sagebrush (Artemisia tridentata), matchweed (Gutierrezia sp.), June-grass (Bromus tectorum), and wheatgrass (Agropyron spp.), cliff rose (Cowania stansburiana), red skunk flower (Gilia aggregata), several Penstemon (Penstemon spp.), a number of Astragalus, many species of Eriogonum and numerous Cruciferae are also mentioned. The focus of bird study was on niche differentiation. Three obligate species of this community are recognized. These are the pinon jay (Gymnorhinus cyanocephala), the gray titmouse and the lead colored bush-tit (Psaltiriparus minimus). Fourteen other species described as summer residents were examined.

Various aspects of ecology, interspecific and intraspecific competition were examined for each species. Hardy concludes that niche separation effectively reduces competition between bird species of this community.

## 1432

A 20-acre plot was censused for breeding birds one-half mile south of Boulder, Colorado. The rectangular plot was a pine covered mesa at an elevation of 5,900 feet. Coverage of the census was between April 25 and July 25. Ten species were observed. Forty-three territorial males were noted. This equates to a value of 215 males per 100 acres.

## 1433

A 20-acre plot was censused for breeding birds one-half mile south of Boulder, Colorado. The rectangular plot was a pine covered mesa, at an elevation of 5,900. Coverage of the census was between March 6 and August 7. Twenty transects on the area were run. Nine species were observed. Forty-eight territorial males equal to 240 per 100 acres were seen.

## 1434

A July bird survey was run thru a sagebrush flat in Campbell County. The plot was 12.26 hectares or 30.3 acres at 4,400 feet elevation. The sub-dominant shrub species were prickly pear (Opuntia-spp.) and rabbitbrush (Chrysothamnus nauseosus).

The total number of species present was eight. Forty-seven territorial males or nesting pairs, equal to 155 per 100 acres, was calculated.

## 1435

This breeding bird census was located in a floodplain cottonwood forest. The habitat was next to the Platte River in Jefferson County, Colorado. The elevation was 5425 feet. Fourteen acres of mature dense groves of plains cottonwood (Populus sargentii) are interspersed with 10 acres of open grassland.

Twenty-six observation periods were completed between April 3 and August 18. Totals were 24 species, 164 occupied nest or territorial males, equated to 683 per 100 acres. Excluding a colony of nesting herons, 155 territorial males, equal to 646 per 100 acres was observed.

1436

Breeding birds were surveyed about six miles south and one mile west of Johnstown, Colorado. This cottonwood riverbottom-pasture was on the east bank of the St. Vrain River. The plot was 176.9 acres at an elevation of 4,790 feet. Fifty percent of the plot was grazed pasture with corridors of deciduous trees interspersed. The three dominant woody species were cottonwood (Populus sargentii), willow (Salix spp.) and snowberry (Symphoricarpos occidentalis).

Eleven trips across the plot were completed between May 21 and July 12. Fifteen species were observed. Sixty territorial males equated to 34 per 100 acres were seen.

1438

This article investigates whether nesting sites were chosen because of the altitude and zone or because of local habitat conditions. The study was made at Science Lodge, the University of Colorado biological station, at an elevation of 9500 feet in the mountains twenty-eight miles west of Boulder, Colorado. The study covered a five week period, July 21 to August 22, 1941.

The American pipit appears to be confined to one zone, the Arctic-Alpine, and may be accurately said to be "characteristic" of that zone.

The dipper definitely is a bird of opposite tendencies, breeding entirely according to local conditions, regardless of zone and altitude.

The American magpie, Red-naped sapsucker, and warbling vireo appear restricted to certain vegetation for nest sites and breed wherever their preferred vegetation grows, regardless of zone. A large number of species appear to breed practically from the plains to timber line, disregarding zone and altitude, and nest wherever local conditions are satisfactory. In this group are the robin, mountain bluebird, broad-tailed hummingbird, house wren, and red-shafted flicker.

A number of other birds appear to breed from 8000 feet to timber line, regardless of zone. In this class may be listed the gray-headed junco, green-tailed towhee, Townsend solitaire, and hermit thrush.

1440

Observations of bird life were summarized for the region. Relative abundance, rare observations and unusual situations concerning avifauna were reported in a popularized fashion.

1441

Observations of bird life were summarized for the region. Relative abundance, rare observations, and unusual situations concerning avifauna were reported in a popularized fashion.

1444

The study was conducted on Burro Hill, about 40 km northwest of Jackson, Teton County, Wyoming within the Bridger-Teton National Forest (Fig. 1). The elevation ranges from 2097 to 2253 m. On Burro Hill mountain big sagebrush (Artemisia tridentata vaseyana) was the dominant shrub, forming dense, homogeneous stands with grasses and forbs present as a continuous understory.

On 3 June 1974, the U.S. Forest Service burned 15-20 ha (spring burn) on the eastern end of Burro Hill, resulting in a mosaic of patches ranging from completely burned and partially burned, to unburned. Control areas were established on an unburned portion of Burro Hill.

Permanent bird censusing plots of the following sizes were established within each burn and control area: spring burn, 10.5 ha; fall burn, 10.8 ha; unburned control, 10.0 ha. Breeding bird populations were estimated using the Williams (1936) spot-mapping technique. Non-breeding birds were counted during breeding bird censuses, and all birds were censused after the nesting season using strip transects on the permanent plots. Breeding bird density on the spring burn in the first postburn year was 61 percent lower than the control. Breeding bird density on the fall burn was drastically reduced. In the first postburn breeding season (1975), no birds bred on the area, since there was no suitable habitat for breeding. In the second postburn season, breeding bird density on the fall burn increased to 28 percent of the density estimated on the unburned plots. In contrast to breeding birds, non-breeding bird densities increased in the first postburn season on both spring and fall burns. Both burns resulted in open areas which the non-breeding birds used for hunting and foraging, some within minutes after the fire.

Three years after spring burning, and two years after fall burning, total densities were essentially equal but still lower than unburned values. Therefore, the analysis of the total avifauna without distinguishing between breeding or non-breeding, can be misleading. In the earliest and most fire damaged seres, non-breeding birds contributed heaviest to the total density; and this contribution decreased with time after the fire.

Avian communities on the burned areas became more similar to the avifauna on the unburned control in succeeding years. Three seasons following spring burning, the burn and unburned control were 89 percent similar, while the fall burn was 76 percent similar to the unburned control after two years.

1445

Kathleen M. Oakes studied the bird community of Coal Creek near Gillette, Wyoming. Forty-eight species of birds, represent 22 families and 10 orders, were observed from September 1974 to 1975. Birds are separated according to their seasonal occurrence. Nesting species are further classified according to regularity of occupation on the site. Densities of nesting pairs are calculated. Some aspects of avian ecology were also included in the text.

1446

Observation of the birds in Rocky Mountain National Park, Colorado, revealed that midsummer wandering is a regular pattern in the behavior of some Colorado birds. It takes place as a wandering to elevations higher than the nesting habitat. Altitudinal wandering is a more or less regular habit of mountain birds.

1448

Accuracy of six census methods in estimating breeding populations of five species of birds was investigated on the shortgrass prairie on 10, 8.1-ha plots and a 39.4-km roadside route. Methods evaluated included spot-mapping, flushing, total count, ratio, roadside and Emlen strip count procedures. Systematic nest searches provided an absolute base. Live-trapping on the study plots gave a second index of breeding densities. The mapping method was the most accurate.

Final calculated densities were horned larks - 51.9 pr/100 ha, McCown's longspurs - 28.4, lark buntings - 27.2, Brewer's sparrow - 13.6 and western meadowlarks - 4.9.

A detailed field analysis was made of factors affecting the accuracy of the mapping method. Those factors tested were width of the census strip, speed of traverse, time of day, observer variation, weather and species effectivity.

1450

The numbers and biomass of the dominant birds have been studied on and around the Pawnee National Grasslands, Colorado, since July 1968. Counts were made at approximately weekly intervals (April 15 to August 15) in six 20-acre plots and along a 50-stop, 24½ mile roadside route. The remainder of the year, counts were less frequent, usually every 2 weeks. Raptors were counted in a 56-sq. mile study area and along various roadside routes. Counts from the Pawnee Site are compared to those from seven other 50-stop routes in Colorado which are part of the North American Breeding Bird Survey.

In 1971 the total number of breeding pairs (59.0) on the six 20-acre plots was approximately the same as that observed in 1970 (58.2). Fluctuations in populations of various passeriforms are recorded. Other passeriform populations have remained stable over the two year period. Overall, breeding bird densities on the plots in 1971 were below those noted in 1969, but above those noted in 1968. The IBP 50-stop roadside count findings were comparable to those noted on five other routes in Colorado for the years 1968-71.

Raptor numbers noted in the fall of 1969 and 1971 were quite similar. Wintering populations for three winters, however, differed considerably.

The productivity of the large birds of prey in 1971 was analyzed and compared with data in 1970. Prairie falcons produced the most young per nest (4.00 in 1971) and Swainson's hawk the least (0.64 in 1970).

1452

A late December bird survey was run in El Paso County, Colorado. Ten traverses through the plot were made. The four dominant tree species present were pinyon pine (Pinus edulis), red cedar (Juniperus scopulorum), one-seed juniper (J. monosperma), and ponderosa pine (P. ponderosa). The two dominant shrubs were mountain mahogany (Cercocarpus montanus) and scrub oak (Quercus gambelii).

Twenty-two bird species were observed. The calculated density was 89 individuals per 100 acres.

1453

Size of feeding territories among bird species are discussed. A table listing mean territories or home range sizes, body weights, and clutch sizes for the bird species used in this study is available.

1456

When the three forest communities are considered together, the best represented families in number of species are the Fringillidae, the Turdidae, and the Corvidae. However, on the basis of individuals, the families stand in the order: Fringillidae, Sylviidae, Turdidae, and Paridae. When the number of individuals is considered for each plot separately, the order of abundance is similar, except for the entire absence of the Sylviidae in the lodgepole pine forest.

The density of breeding pairs for the montane, the subalpine, and the lodgepole pine forests are 102+, 94+, and 59+, respectively.

It is evident from table 1 that the four families (Fringillidae, Sylviidae, Turdidae and Paridae) with the most individuals are fairly well distributed among the three study areas. Furthermore, three of the five most abundant species are found in each of the three areas. In these cases the bird community did not change with the plant species but appeared correlated with the life form of the vegetation. The ruby-crowned kinglet, however, did not nest in the lodgepole pine plot, although this forest was intermediate in elevation between the subalpine forest and the montane forest, in each of which the bird was abundant. Apparently some feature of its niche was lacking. The junco occurred on plots 1 and 2, but at the elevation of the subalpine forest the birds were restricted to the edge conditions. In the two lower areas more edge existed within the census plots. It appears that this species is also reacting to the structure of the vegetation.

Thus, each species occupies its niche, even when it occurs in more than one plant community regardless of the species composition of plant dominants. Hayward (1954), in a study of coniferous forests in Utah, found a similar close biotic relationship between the montane and the subalpine forest. He found that almost 100 per cent of the mammal and 61 per cent of the bird species occurred through both forests.

Censuses of breeding birds were carried out in three plant communities in the Rocky Mountains of Colorado. The populations per 100 acres (40 hectares) were: 102+ pairs in Douglas fir and ponderosa pine, 94+ pairs in Englemann spruce and subalpine fir, and 59+ pairs in lodgepole pine. The most abundant species were the mountain chickadee, ruby-crowned kinglet, hermit thrush, pine siskin, and gray-headed junco, and all except the kinglet occurred in each of the three communities.



In the Rocky Mountains, an increase in elevation is correlated with an increase in birds of Old World origin and a decrease in birds of North American origin. This correlation is apparently brought about, in part, by the increase in the percentage of coniferous forest and the decrease in the percentage of deciduous forest in the vegetation at higher elevations.

In the climax coniferous forest community in the Rocky Mountain most of the breeding pairs are of species of Old World origin and are in large part permanent residents.

## 1457

This breeding bird survey was conducted one mile east of Franklin, Colorado. Ponderosa pine (Pinus ponderosa), scrub oak (Quercus gambelii), and mountain mahogany (Cercocarpus montanus) dominated the site. This study was based upon observations made between 9 am and 4 pm. Number of species observed totaled 4. Twenty-seven territorial males were counted and equated to 135 per 100 acres.

## 1458

Table 1. Number of species of herbs, shrubs, trees, birds, and mammals present in lodgepole pine communities ranging in age from 1 to 300+ years.

Study area	Years since burn	Estimated numbers of species					totals
		herbs	shrubs	trees	birds	mammals	
1966	1	6	1	1	no estimate	no estimate	
a*	3	17	1	1	no estimate	no estimate	
1960	7	31	2	2	15	5	55
1954	13	41	1	2	16	9	69
1942	25	73	5	3	19	12	112
1910	57	18	4	3	10	4	49
1856	111	18	3	2	10	5	38
Oldest	300?	14	3	3	13	5	38

\* a) the 1966 area was examined again in 1969

Table 2. Summary of avifauna and small mammal successional trends in lodgepole pine forests.

Avifauna	Time (in years) since study areas were last burned					
	7	13	25	57	111	300
No. breeding pairs/405 ha	209.8	234.9	199.8	30.4	48.6	48.8
Standing crop biomass (gm)	17,538	19,139	13,536	1,852	3,827	3,381

1459

This breeding bird survey in an immature Douglas fir forest was completed between May 30 and July 13. The site is located in Genesee Mountain Park, 15 miles west of Denver. The plot was 20 acres. The dominant tree stand was 90 percent Douglas fir (Pseudotsuga taxifolia). The elevation was between 7900 and 8200 feet.

Seventeen species were observed. Total territorial males were 14.5 calculated to 73 per 100 acres.

1462

Bird species of five census plots of prairie grassland and shrubland habitats in northeastern Montana are sampled. The five census plots vegetation types are: (1) silver sagebrush flat, (2) silver buffaloberry-redosier dogwood coulee, (3) silver buffaloberry-silver sagebrush coulee, (4) needle-and-thread blue grama grassland, and (5) shrubby swamp and sedge hummocks.

Vegetation is classified using a modification of Daubenmire's coverage classes.

Bird observations are detailed to dates of transects, time of transect, birds observed, numbers observed, density of territorial individuals and visitors to the plot. Nest status and other vertebrates encountered were also reported.

1463

This breeding bird survey, of sagebrush:steppe, was located about 6 miles north of Gillette, Wyoming. The plot was a rectangle of 20 acres. The vegetation was dominated by big sagebrush (Artemisia tridentata) with some silver sagebrush (A. cana). Needle-and-thread grass (Stipa comata) was the most prevalent grass species. Topograph was flat with an elevation of 4300 feet.

Surveys were ran between the dates of April 1 and June 10. Seven species were observed. Eighteen territorial males equal to 90 per 100 acres were found on the plot.

1464

A bird banding station was set up 16 miles south of Gillette, Wyoming. One objective of the establishment of this station was to determine what species of birds inhabit the area to provide a data base for planned reclamation. The station consisted of mist nets and a 20" x 20" x 38" cage trap. Vegetation where the station was placed was a caragana-alder wind row. The wind row was 40 yards wide and 100 yards long. One hundred and seventy-three individuals representing 25 species and 9 families were banded. Ten species and 136 individuals in the family Fringillidae represented 78% of all birds banded. Lark buntings, lark sparrows and chipping sparrows were the most commonly captured birds.

1465

Two breeding bird surveys were completed near Gillette, Wyoming. The plots were 20 acre rectangles. One was located in a northern grassland and the other on a seeded grassland. The northern grassland was dominated by cheat grass (Bromus tectorum), needle-and-thread grass (Stipa comata), and blue grama (Bouteloua gracilis). Big sagebrush (Artemisia tridentata) was widely scattered on the site. The seeded grassland was planted to crested wheat grass (Agropyron desertorum) and wheat grass (A. smithii). Elevation on both sites was 4500 ft.

The observations on both sites were completed between April 1 and June 9. Four species were observed on the northern grassland site. Ten breeding males equal to 50 per 100 acres were found on the same site. The seeded grassland site yielded observation of two species. Nine territorial males equaled to 45 per 100 acres were found on the seeded grassland.

1466

Intensive studies of the nesting birds in four plant communities representative of the White Rocks-Bandlands unit of the Missouri River "Breaks," Montana were conducted during the summer of 1967 and 1968.

Four communities were investigated. These were greasewood-sagebrush shrubland, sagebrush grassland, pine juniper woodland, and cottonwood forest. The greasewood-sagebrush shrubland has the fewest species and lowest relative density of the four communities. Density for all breeding species averaged 65 pairs per 100 acres. The lark sparrow and the western meadowlark were numerically the most important species. Although life form measurements and frequency ratings for big sagebrush and greasewood are similar in this habitat, a more granular soil under big sagebrush appears to be a nesting requirement for the lark sparrow.

The sagebrush-grassland community supported six species and 78 pairs per 100 acres. The Brewer's sparrow was by far the most abundant species. The greatest density of nesting Brewer's sparrows was found in silver sagebrush areas having a canopy coverage of around 50 per cent.

The pine-juniper woodland provided a diversified ecological community for nesting birds and supported about 146 pairs per 100 acres. The mourning dove was numerically the most important and was the only species having the ecological adaptability to nest in all of the major habitats found in the study area.

The cottonwood community supported the largest population of nesting birds (390 pairs per 100 acres) and the greatest number of species (30). This community provided more opportunities for ecological specialization and nesting sites than the habitats in the other communities because of its multi-storied vegetation and greater total biomass.

1467

Bird populations of a small Utah marsh were studied intensively during 1950 and 1955. During 1950, the vegetation was lush and held large populations of ducks, geese, and wading birds. Nests of Anatidae were most abundant; 6.6 nests were found per acre of vegetation. Colonies of the great blue heron, black-crowned night heron, snowy egret, and white-faced ibis were present.



Drought conditions prevailed from 1952 through 1955, and irrigation demands reduced water available to the marsh. Deterioration of the vegetation from lack of water and intensive over-grazing by cattle was reflected in the bird populations. Duck populations dropped from 6.6 to 2.7 nests per acre and the colonies of all wading birds except the great blue herons disappeared; the latter declined 92 per cent. Especially significant was the disappearance of deep-water species such as the pied-billed grebe, western grebe, and ruddy duck. Only the gadwall, a bird of dry land nesting habits, increased slightly.

## 1468

This report analyzes the ecological relations of breeding birds on two 10. ha plots subjected to different grazing regimes at Pawnee National Grasslands, Colorado. Emphasis is given to the relation of various population parameters (species diversity, density, interspecific spatial overlap, biomass) to vegetational heterogeneity, and the position of the Pawnee results in relation to grassland-shrubsteppe samples from other areas.

## 1472

A table of comparative data on various plant associations and the species of birds inhabiting the various associations was provided. Various grazing intensities on palouse prairies, shrub-steep, montane grassland and shortgrass prairie were compared. Number of bird species, total density of birds, total biomass, single species dominance percentage, and dominant species were some of the data included.

## 1474

This five-year quantitative study was conducted to determine the patterns of change or balance that occurred throughout a typical avian reproductive season in a montane community of Colorado's Front Range.

A 20 hectare tract in Crow Gulch on the lower slopes of Pikes Peak, near Colorado Springs, Colorado, was censused for five breeding seasons, 1967 to 1971. Fifty species bred on or visited the study area, but on the average, only 78% of these were seen in any one year.

Avian density averaged 93 pairs/40 ha, representing an average of 22 breeding species and 11 visitor species yearly. Most breeding species showed constant yearly densities, and the seven dominant species totalled over 50% of the breeding pairs. Relative density of most species changed within the breeding season. High relative densities were strongly related to vegetative type while low densities were not. A temporal spacing of nesting activity by the different species indicated a partitioning of the breeding season. Woodpecker numbers may limit the densities of other hole-nesting species. Bird species showed strong vegetational preferences, especially for aspen. Fewest birds were found in Douglas fir and mixed forest.

1476

The readily apparent cause of high waterfowl concentrations high in the mountains is the abundance of warm shallow waters in both the streams and lakes which favor production of the preferred foods.

1480

Western meadowlarks (*Sturnella neglecta*) were studied to document their nesting behavior in eastern Colorado. Males set up territories averaging four hectares. Nest construction was done only by the female, and began the third week in April. Nests were built in clover and grass fields and contained an average of 5.2 eggs. Predation appears to be an important factor in the low fledging success of Western meadowlarks.

The Western meadowlark is a highly visible and abundant bird in the eastern plains of Colorado. There has been no thorough report and photographic study of the nesting behavior of this species. Bailey and Niedrach (1965), state that although Western Meadowlarks are tame, they are not easily photographed, and often desert their nest when disturbed. The purpose of this report is to describe the nesting behavior of Western meadowlarks.

The study area was located 8 km east of the foothills and 10 km south of Fort Collins, Colorado. The major study area was partially divided by county road 34, with fields of winter wheat on one side and clover on the other. Another area of mixed forbs and grasses was studied in less detail.

The most abundant birds were Western meadowlarks. Other birds in the area included red-winged blackbirds (*Agelaius phoeniceus*), ringnecked pheasants (*Phasianus colchicus*), savannah sparrows (*Passerculus sandwichensis*), and lark buntings (*Calamospiza melanocorys*). Thirteen-lined ground squirrels (*Citellus tridecemlineatus*) were the most abundant mammal other than mice and voles.

Nests were located by observation of female Western meadowlarks from 10 April to 5 May. All nests were located during construction by sighting females flying to the nest with grass. Once located, nests were marked with a stake placed 2-3 m away.

1483

Some of the characteristics of nest site selection have been shown for the lark bunting for the shortgrass plains. In this environment, a protective plant is found by each nest. Saltbrush is "used" more often in this plant and nest association than any other plant. Browse type vegetation is associated with the nest in a protective role more often than grass and the annual forb types.

The placement of nests on the lee side of the protective plant reduces impact of the physical environment.

Nest densities were highest in the bush and grass areas. The brush and grass areas were followed by shortgrass, areas of generally taller vegetation. The nest densities were 0.125, 0.10, and 0.06 birds per acre.

(1483)

Shading of the nest by an associated plant allows the highly visible male to participate to considerable extent in the nesting activities. The male was found to share incubation and brooding with the female.

The plant food averages 36% of the diet, consisting almost entirely of seeds and grains, with mere traces of leafy matter. Prominent among the seeds found were wheat, buffalo grass (Buchloe dactyloides), sunflower (Helianthus annuus), and sedge (Carex sp.)

The animal food represented 64% of the diet in the adult lark buntings examined.

1484

A field study of the lark bunting was conducted in the summer of 1969. Males arrived during the first week of May, females a few days later, after the males had dispersed. Nests were built on the ground closely associated with a protective plant. Red threeawn was associated with 62.7% of the nests.

Eggs were laid daily. Mean clutch size was 3.6 eggs per nest. Both sexes incubated, although females were incubating 70% of the 113 nest visits. Incubation was about 12 days, and hatching spread over 28 hours. Hatching success was 65%. Nesting density was 0.7 nests/acre.

Nesting food examination showed grasshoppers comprised 65% of the prey. Males departed the Pawnee Site by the first of September. Flocks of females and immatures remained until 21 September.

1487

Nesting habits of the Oregon junco (Junco oreganus) in the extreme northwestern corner of Montana were reported. Numbers of breeding pairs for four habitat associations were also reported. Dates of various stages of breeding activity are included for various elevations.

1488

This study reported on indigo buntings in Utah with special reference to inter-specific competition with the lazuli buntings. There is evidence of indigo buntings expanding range into south and central Utah. Ten habitat variables are compared for these two species. Significantly, different habitats are utilized by the two species when examined by analysis of variance and discriminant function analysis.  $\alpha = 0.01$  ( $F = 6.1425$  W/10 and 388 degrees of freedom).

Lazuli prefer areas with higher shrub density and lower ground cover than the indigo bunting, which prefer hedgerows along alfalfa fields and the former in tamarisk stands with occasional cottonwood.

1489

A population of greater sandhill cranes (Grus canadensis tabida) nesting in northern Rocky Mountain states was studied from 1969-71. Formerly abundant, only an estimated 188-250 pairs remained in this region by 1944. The subspecies was listed as "rare" in 1966. Our surveys show that breeding cranes have increased substantially since 1944 and most nest in a 500 to 550 X 200-km region from north-eastern Utah northward along the Idaho-Wyoming border to southwestern Montana. Over 1,700 sightings of 251 cranes color-marked on breeding areas show that they migrate mainly in September and early October. Color-marking revealed that flocks of greater sandhill cranes at winter and spring migration sites are of mixed origin with respect to their specific nesting areas. An estimated 10,000-15,000 "large" sandhill cranes were wintering in 1970-71 in areas frequented by color-marked greater sandhill cranes.

1496

The diet of the mourning dove (Zenaidura macroura) was studied for the spring and summer months of 1970 and 1971. Thirty-one birds were collected for the study. The diet consisted of over 99.9% seeds and less than one-tenth of one percent, arthropods and molluscs. The most important food types were bee plant (Cleome serrulata) (28.1%), grasses (24.3%), and composites (19.6%). Almost 76% of the mourning dove diet was composed of seeds from plants characteristic of disturbed habitats, i.e., roadsides, cultivated and abandoned fields. Comparisons of adult and juvenile diets during mid-summer revealed that juveniles ate mainly composites and grasses (96%), while adults consumed seeds of bee plant and spiderwort (Tradescantia occidentalis) (68%).

1494

The area occupied by a pair of dippers in the Gothic region during the nesting season consists of a stretch of stream and its banks a half-mile or so in length and sometimes near-by tributary streams and beaver dams.

Two characteristics common to all of the dipper nests observed were their

(1494)

location over, or nearly over, the edge of a stream, and their high degree of inaccessibility. The water beneath, in most instances, was swift and deep, thus forming a barrier to approach; and the usual location of the nest in a niche in a wall completed the protection. Dipper nests are not always built where they receive spray.

1504

The "aberrant" dry land nesting behavior shown by the redhead and ruddy ducks was precipitated by the large quantity of proteinous food available to redheads and ruddy ducks seeking territories. Redheads were able to "pioneer" and breed successfully in recently developed marshland in spite of a scarcity of nesting cover usually considered acceptable to this species. Marsh managers and researchers must recognize that these species are more adaptable than previously reported. Marsh managers and researchers must no longer assume that a scarcity of emergent vegetation is the sole cause for a low incidence of nesting by these species. Marshlands must be considered as dynamic ecosystems with a multitude of variables which may affect waterfowl production.

1506

This paper reported two nestings of the pigeon hawk since June 1, 1973 in Idaho. The two tree species utilized for nesting were aspen (Populus tremuloides) and juniper (Juniperus osteosperma). In both situations, old black-billed magpie (Pica pica) nests were utilized. Foods of these two pairs of bird were reported as mourning doves (Zenaida macroura), horned larks (Eremophila alpestris), meadow-larks (Sturnella neglecta), and redwinged blackbird (Agelaius phoeniceus).

1507

Babesia moshkovskii was found in the blood of 6 of 30 downy prairie falcons and in none of five adults from Wyoming. Intestinal parasites included Neodiplostomum spathula, Cladotaenia globifera, Physaloptera, and Serratospiculum amaculatum. Ornithodoros concanensis, Thrassis francisi, Opisocrostitis, Degeeriella rufa, Simulium canonicola, and an unidentified hippoboscoid fly, were external parasites. It is considered that the soft tick, O. concanensis, is the most likely vector of the hematozoon. The morphological forms of B. moshkovskii are described and discussed. This is the first report of an avian babesoid on this continent.

1508

The average range of four marked males in the two winter periods was 3.8 miles (6.1 km), while that for six marked females was 7.2 miles (11.5 km), suggesting that females have larger ranges than males. However, these means are not significantly different (t-test at the 95 per cent level of confidence), perhaps because of the small sample sizes.

Prairie falcon nest only on cliffs where there are ledges suitable for the placement of eggs, and all such formations that could be found were checked.

(1508)

The sex ratio of 91 nesting prairie falcons handled was very near 50:50.

Prey remains found included horned larks and Richardson's ground squirrels (Citellus richardsonii) most often, and sometimes exclusively. Western meadowlarks were the third most frequent prey found.

A counting route was set up on the Laramie Plains in June, 1960. This intermontane basin has an area of more than 2,000 square miles. In 1960, six complete trips were made over the 38.9 mile (62.2 km) post-nesting area counting route, while ten trips were made in 1961. The greatest number of prairie falcons seen averaged 1 per 2.4 miles (3.8 km). Resident population decreased until all falcons were gone on October 15th. The average maximum movement of six marked birds in the 1960 post-nesting period was 1.8 miles (3.1 km) and that of six marked birds in the 1961 period was 2.7 miles (4.3 km). The maximum distance of movement was 4.8 miles (7.7 km) recorded in 1961 for two adult females.

Prairie falcons frequent open areas. The low-level style of hunting necessitates the absence of tall vegetation. The distribution of prairie falcons is correlated with the distribution and numbers of horned larks, which in turn, are apparently related to climatic conditions and the location of suitable winter habitat.

An ideal prairie falcon cliff has a sheltered ledge which provides a location for the placement of eggs, gravel, or loose material on the ledge where the egg depression may be scraped, and the ledge overlooks at least some treeless country for hunting. Given these features, an outcropping can be occupied by falcons even though it may be less than 30 feet (9 meters) in height.

1509

During intensive studies of white-tailed ptarmigan (Lagopus leucurus) in Colorado from April, 1966 through the present, numerous observations of prairie falcons were made, with at least one eyrie being located. This eyrie in Rocky Mountain National Park, Larimer County, Colorado, at 12,100 ft. elevation, was used by at least one prairie falcon each year from 1966 through 1973.

Eighty-nine prey individuals were identified. The diet included the most common prey species in the area and differed from most other reported summer diets of prairie falcons in the high proportion of small birds. The most frequent mammalian prey was the pika (Ochotona princeps), an abundant diurnal inhabitant of the area.

1510

Fifty-six, 74, and 101 prairie falcon (Falco mexicanus) nesting territories were observed along 72 km of the Snake River in southwestern Idaho during 1970, 1971, and 1972, respectively. Nesting success averaged 83 percent during the 3 years of study. Clutch size averaged 4.3 eggs in 68 nests visited. An average of 3.5 young hatched and 3.1 young fledged in 110 nesting attempts; 3.7 young fledged per successful attempt. Townsend ground squirrel (Citellus townsendii) was the prey species found



(1510)

most frequently in prairie falcon nests; horned larks (Eremophila alpestris) and western meadowlarks (Sturnella neglecta) were found less frequently. Egg mortalities totaled 37 percent, and infertility accounted for 11 percent of 300 eggs counted. Nestling mortality was 17 percent of 221 falcons hatched in 1971 and 1972. One-half of the nestling losses was due to unknown causes. Based on these data, the population is considered reproductively healthy and stable or increasing.

1512

The text of this article contains ecological data on both the peregrine and prairie falcon. The text focused on interspecific and intraspecific competition between those two species. Areas of sympatry were detailed with prey species comparisons, and eyrie site comparisons.

On the average, there was one peregrine eyrie site for every 225 sq. miles (583 km<sup>2</sup>) in an area of about 4,500 sq. miles (11,655 km<sup>2</sup>) surrounding the Utah and Great Salt lakes. The average distance between 13 eyries along 130 linear miles (209 km) of the Wasatch Mountains was 10.0 miles (16.1 km) (range, 2-20 mi; 3.2-32.2 km).

The average distance from eyrie to hunting sites in the marshes was only 1.3 miles (2.1 km) (range, 0.19-2.8 mi; 0.31-4.5 km) for three desert eyries. For the nesting sites in the region of the Utah and Great Salt lakes, the distances averaged 3.3 miles (5.3 km) (0.19-9.7 mi; 0.31-15.6 km). Marshes used by peregrines at the desert eyries usually were less than 3 sq. miles (7.8 km).

Pairs of peregrines nesting along the Wasatch Mountains fed their young mostly shore and marshbirds, many of which were obtainable only from Great Salt Lake marshes up to 17 miles (27.4 km) distant. Avocets and willets were the species of shorebirds most used. Passerine and gallinaceous prey species were of greater importance and aquatic prey species of lesser importance in the desert eyries.

In regions of Utah where the populations of the peregrine were greatest, pairs of prairie falcons and peregrines nested much closer together than did pairs of peregrines or pairs of prairies. The two species sometimes even used one another's alternate nesting sites. The prairie falcon was less selective than was the peregrine in its choice of nesting sites.

The prairie falcon, in its association with the peregrine, appears to be the dominant competitor.

1516

The prairie falcon ranges throughout Colorado, showing a marked preference for the lower foothills wherein to nest and raise its young. When choosing a suitable nesting site, these noble birds make sure of ample open ground over which to hunt. Those individuals that nest deep in the mountains make their homes in the tall cliffs over-looking wide mountain valleys or on the sides of the many mesas of table-mountains. In some rather densely populated sections it is not unusual to find two pairs nesting within three or four hundred yards of each other, and in one

(1516)

instance, we counted twenty-three pairs in sixteen miles of cliff.

We have found the prairie falcon very abrupt in changes from a diet of rodents to one exclusively of birds about the time that the young falcons are hatched. Probably the most common form of bird life preyed upon by the prairie falcon is the western meadowlark, with the mourning dove running a close second. The prairie horned lark, lark bunting, rock pigeon, magpie, and even the burrowing owl make up the remainder of the avian diet. The thirteen-lined spermophile makes up the main portion of the rodent diet.

## 1517

Prairie Falcon - The winter habitat frequented by the falcons, was dry-farm wheat lands and grassland flats characteristically occupied by large flocks of horned larks, and rosy finches.

Gyr Falcon - Large falcons usually occupy cliffs of some sort as nesting sites. However, there were instances of their using man-made structures. One feature most common to gyrfalcon nestings is the protection of the site from above by some sort of projecting cover, usually overhanging rock.

## 1525

The study area totaled about 5,000 acres, 3,000 being open water varying in depth from a trace to thirty inches. The open water forms a large lake that supports a dense growth of pondweeds. Ninety-five percent of the 2,000 acres of Unit II (not open water) is occupied by well-defined vegetative cover types.

In general, nests were located toward the lower parts of the marshy area. Only three nests were within one mile of the entrance of the Bear River into the Unit.

Thirty percent of the nests were located in three percent of the area--that occupied by hardstem bulrush. Cattail ranks second in cover attractiveness with 6% of the acreage but 21% of the nests. Saltgrass, covering 26% of the area harbored 25% of the nests. In contrast the 59% of the area grown to alkali bulrush contained only 20% of the nests. Escape invariably occurs by means of flight to open water. It is thought that the advantage of ready vision over surrounding areas influences the choice of nesting sites.

An adequate supporting base for nest building is perhaps the deciding factor in influencing choice of site. Hardstem bulrush, with its tendency toward the formation of dense mats, and saltgrass, with its short but dense growth, fulfill this need for nest building. Alkali bulrush apparently must be supplemented by a firm base such as is provided by a muskrat house in order to be suitable for nesting. Cattail seems to be similarly deficient.

Of the total of 95 nests only 16% and 8%, respectively, were beyond 50 feet from channels or open water, while 63% and 77%, respectively, were within 30 feet.



1528

Sage grouse (Centrocercus urophasianus) were studied in North Park, Colorado, during the winters of 1973-74 and 1974-75. Distribution was plotted from sightings of 199 flocks and 17 single birds, totaling 5,080 grouse. Only 50 percent of the 1,252 km<sup>2</sup> of lands dominated by sagebrush (Artemisia spp.) sustained winter use by grouse because of snow depth, steepness of slope, and sagebrush disturbance. Nearly 80 percent of the use occurred in 7 areas comprising less than 7 percent of the total area. Sexes segregated; males formed more unisexual flocks. Flocks were the dominant social unit and contained less than 50 individuals in 88 percent of all observations. Flocks containing more than 50 percent females were larger than male flocks and used denser sagebrush stands for feeding and loafing. Roosting and feeding sites had similar vegetal and physical characteristics. Sixty-six percent of flocks were on slopes less than 5 percent, and only 13 percent were on slopes greater than 10 percent. Sixty-two percent of 2,350 grouse in 1973-74 and 61 percent of 1,984 grouse in 1974-75 were females.

1535

Wintering areas have been altered and reduced in size through reservoir construction, development of roads, mining activity, domestic livestock grazing and increased recreational use and development. Maps of known wintering areas are presented.

1540

The study is concerned with distribution and habitat requirements of the greater prairie chicken (Tympanuchus cupido pinnatus) of northeastern Colorado in Yuma County. Winter food was found to be the limiting factor in maintaining the prairie chicken population. The study revealed that the major food source was cultivated grain fields. Habitat is the other limiting factor. Short grass areas are required for booming grounds and tall grass areas are ideal for nesting sites. The tall grass areas also provided adequate cover for the prairie chickens from predators. The total land mass needed to maintain a population varies from area to area. In Colorado, 23,040 acres is required while under ideal conditions, 5,000 acres would be required.

1541

This study is concerned with food habits of the sharp-tailed grouse (Pedioecetes phasianellus jamesi) and the Greater Prairie chicken (Tympanuchus cupido pinnatus). The major common food preference were cultivated crops. The common dandelion (Taraxacum officinale) was the most commonly used food source during the spring of the year. Other food sources that were selectively taken were: Rose hips - Rosa arkansana; Wolfberry fruits - Symphoricarpos occidentalis; Clover - Trifolium spp.; Prickly lettuce - Lactuca serriola. Short-horned grasshoppers (Acrididae sp.) were the most important insect consumed in the summer, fall and winter months.

1553

The occurrence of sage grouse was examined as related to sagebrush control. This Montana study took place during the summers of 1962 through 1964. Vegetation measurement on sprayed and unsprayed areas were compared. Vegetation was also measured on sage grouse locations. Sprayed areas comprised 1,710 acres of the 1,900 acre study area. The grass and forb percentages in the sprayed area were 60 and 40, respectively. The control areas revealed grass and forb percentages of 80 and 20 respectively. The sprayed areas exhibited 97 percent kill of sagebrush. Only

4 percent of sage grouse observations were made in sprayed areas even though these areas were 9 times greater in area than unsprayed sagebrush stands. Ninety-four percent of all flushed sage grouse returned to unsprayed locations. Young sage grouse broods tended to utilize sagebrush with less canopy cover than did adults or older broods. Big sagebrush (Artemisia tridentata) and dandelion (Taraxacum officinale) provided to be the most frequently present food items contained in collected sage grouse crops. These two food species were most frequently found in unsprayed areas. This fact supported the conclusion that differences in numbers of sage grouse observed in unsprayed and sprayed areas were related to vegetation composition.

1558

The food habits of juvenile sage grouse (Centrocercus urophasianus) were studied in central Montana during the summers of 1966 and 1968. Forbs averaged 75 percent of the diet of 127 juveniles through 12 weeks of age. The flower buds and leaves of common dandelion (Taraxacum officinale) and common salsify (Tragopogon dubius) were the most highly preferred and utilized forbs, comprising 25 and 15 percent of the diets, respectively. Other forbs commonly utilized were prairie pepperweed (Lepidium densiflorum), prickly lettuce (Lactuca serriola), alfalfa (Medicago sativa), curlcup gumweed (Grindelia squarrosa), and fringed sagewort (Artemisia frigida). Big sagebrush (A. tridentata) received little use until the birds were 11 weeks old. Insect use declined steadily from a high of 60 percent of the diet in 1-week chicks to 5 percent in 12-week-old juveniles. Observed brood locations, after chicks were 2-3 weeks old, were less frequent on the sagebrush-grassland benches and more frequent on lower areas until, by September, the majority of broods were located on bottomlands. Sagebrush, 6-18 inches high, was most prevalent at brood sites used during morning and evening activity periods. Important components of juvenile sage grouse habitat in this area appear to be an abundance and diversity of forbs and densities of sagebrush ranging from 1-20 percent.

1567

Radiotelemetry was used in the summers of 1968 and 1969 to determine the habitat use and movement of sage grouse broods. The study was undertaken in central Montana on 268 square miles of which 51.3 percent was occupied by sagebrush-grassland, 16.6 percent by grassland, 14.2 percent by greasewood-sagebrush, 2.8 percent by greasewood, and 1.6 by shale slope. Alfalfa occupied 3.2 percent of the study area.

Five hundred eleven locations of 13 radio-equipped sage grouse broods were plotted. Average daily movement was between 0.25 and 0.5 mile for 12 of the 13 broods. Areas of monthly occupation corresponding to habitat type and total acres utilized were reported. Scattered and common sagebrush (1-10 and 10-25 percent canopy cover respectively) densities received the heaviest utilization by sage grouse broods, throughout both summers. Daily activity revealed the use of more open areas for feeding by day and dense sagebrush use for roosting. In general, broods utilized sagebrush-grassland benches in June and July, shifted to greasewood (Sarcobatus vermiculatus) bottoms and/or alfalfa (Medicago sativa) fields as the forbs on the higher elevations desiccated. Broods remained in these bottoms until late August and early September and then shifted back to sagebrush.

1569

The effects of sagebrush treatments on male sage grouse populations were examined in this study. Strutting ground activity was observed on six different leks. Three strutting grounds closest to the sprayed location increased in activity by 28 percent. Two strutting grounds located greater than 4 km from the sprayed area increased in activity by 323 percent. A decrease of strutting males by 63% was documented on a site within 0.5 km of an area which lost 31 percent of the suitable habitat.

1572

An intensive year-round food habit study of adult sage grouse was conducted in central Montana. Crop contents of 299 adult sage grouse were collected. Frequency and volume percentages of food items found are presented. Sagebrush comprised 62 percent of all foods consumed throughout the year. During December, January and February sagebrush was the only food item in all crops; only during June and July, August, and September did sagebrush make up less than 60% of the diet by volume. Based on this information they conclude that any land management practice which alters the sagebrush community likely will reduce the areas capacity to support a sage grouse population.

1581

This study consisted of two years of observation on a population of golden eagles (Aquila chrysaetos canadensis) in and around Utah and Tooele Counties, Utah. The area can be classified as part sagebrush-shadescale biome, with some juniper and pinyon pine growing on the higher ground. Thirty-one nesting activities were observed over the two-year period. Of these 87% were on cliffs, 6.5% on the ground and 6.5% on an abandoned gunnery tower. The average elevation for the cliff nest was set at 5,750 feet with no nesting activities seen above 6,800 feet. Pair density and home ranges were determined for the 15 nesting activities in the major study area. The greatest unoccupied distance between active nests was 16.1 miles, and the shortest distance between active nest was 0.68 miles. Pair density was set at one pair per 60 square miles in 1967, and one pair per 38 square miles in 1968. Observations concerning home range indicated eight nesting pairs had their nest on the perimeter of their activity area while two pairs located their nest near the center of their activity. Information related to the biology of golden eagles is also contained in this study.

1582

Food found in nest with eaglets were sharp-tailed grouse, jackrabbits, cotton-tails, mountain rats, meadowlarks, or snakes. There always was sharp-tailed grouse in the nest and the author wonders how large a toll eagles take on them. No carrion was ever taken to the eyrie. By the time the eaglets were ready to fly or just starting to fly, it appeared they fed entirely upon sharp-tailed grouse.

1583

The bald eagle probably defends a territory of 2.5 million square meters (about 9.2 square miles) (Broley in Welty 1962); whereas, the golden eagle defends the largest area of those birds discussed of about 93 million square meters (about 35.9 square miles) (Dixon in Welty 1962).

Nicholson in Bent (1937:323) mentioned an area which was ". . . 3½ miles long and 3/4 of a mile wide, in which were seven occupied nests, three of them within a one-mile circle, . . ." Two localities in Florida contained three active nests within 1,000 feet of one another (Broley 1947).

Crows and a herring gull were not tolerated near an eagle's active nest, but a house sparrow built its nest in the side of an eagle's nest. A pair of crows were observed nesting under a bald eagle's nest (Bailey 1927).

Broley in Peterson (1948) considered the owls as the biggest factor causing nest failures with the exception of "bad hurricanes. Owls generally claim eagles' nests before the eagles return to nest, which is then too late for the eagles to build a new nest and raise their young. The nest must be securely situated near an available source of food (Howell 1958c).

#### 1586

This study was undertaken during 1964 to investigate the productivity and the density of a population of Swainson's hawks on a 600 square mile portion of the Laramie Plains, Albany County, Wyoming. Fifty-five pairs and five single Swainson's hawks were found within the boundaries of the study area. The home range of the hawks extended 0.5 mile in any direction from the nest. The actual population density was 155/60 or one pair per 2.6 square miles.

Nesting areas of other raptors found on the study area were fairly distinct, presenting little competition for the Swainson's except in the case of the great horned owls, which utilized groves of trees similar to those used by Swainson's for nesting. A minimum of 35 pairs of crows also nested on the study area. There were indications that Swainson's and crows preyed on each other's nests.

There seemed to be a tendency toward nesting in an open situation such as an isolated tree or the edge of a tree grove.

In 1964, the peak of egg laying occurred around May 24, with a hatching peak on June 21, and the peak of fledging occurring on August 5.

Thirty-one complete clutches were observed which contained two or three eggs with a mean of 2.55. Thirty-two pairs of Swainson's succeeded in fledging 2.12 young per pair. The production of fledglings considering all pairs (55) on the study area was 1.24 young per pair.

A limited food analysis indicated that prey was primarily ground squirrels and pocket gophers with a significant proportion (15-30 percent) consisting of birds.

#### 1587

Winter populations of American eagles were studied in western Utah from 1966-1969. The 1100-square mile study area is characterized by parallel north-south oriented mountain ranges separated by large valleys. Topographic relief ranges from very gentle sloping valley floors and irregular foothills to sharp canyon walls and cliffs. Major plant communities include greasewood, shadscale, horsebrush, winterfat, little rabbitbrush, sagebrush, juniper-pinyon, mountain brush and spruce-fir.

(1587)

Twenty-four nests were located in the area giving an average of one breeding pair per 26 square miles.

Censuses of the entire area showed an increase from 88 birds in 1967-68 to 119 in 1968-69.

The principal prey species of both golden and bald eagles in winter is the black-tailed jackrabbit.

1589

The 2,800-km<sup>2</sup> study area comprises parts of two intermontane basins, Curlew and Raft River valleys, bisected by the Black Pine Mountains and the Utah-Idaho border. Vegetation in Curlew and Raft River valleys lies within the northern desert shrub biome and is delineated into three altitudinally defined zones: the "shadscale" (Atriplex confertifolia) zone, the sage zone (Artemisia tridentata), and the pinyon-juniper zone (Pinus edulis-Juniperus osteosperma).

Forty-three and 54 pairs were found occupying territories in 1972 and 1973, respectively. Of the 65 nesting attempts observed in both years, 54 (83.1%) were successful. Mean clutch size in nests examined was identical in both years (2.8). The number of young fledged were 1.9 and 1.0 in 1972 and 1973, respectively. Based on percent frequency of occurrence, 11 mammal species comprised 90.4% of the total prey items, while six bird species and three reptile species constituted 6.1 and 3.1%, respectively.

Of 97 nest sites, 92 (95%) were located in juniper trees and three (3%) on the ground.

Unless modified to meet the hawks' biological requirements, the conversion of extensive tracts of native vegetation into monotypic stands--either as the result of large-scale brushland conversion programs or intensive agriculture--may reduce their densities and reproductive success due to: (1) increased disturbance; (2) loss of nesting sites; and (3) reduction of major prey populations.

Jackrabbit abundance may be a major determinant of the raptors' reproductive success in a given year, as suggested by a 47% decline in the number of young fledged per occupied territory between 1972 and 1973, concurrent with an estimated 79% decrease in jackrabbit numbers.

1592

This report embodies a portion of the data accumulated during a continuing study of the ecology of the bald eagle, (Haliaeetus leucocephalus) in Yellowstone national Park.

With one possible exception, all of the Yellowstone nests are located adjacent to large lakes or major streams. The proximity to water of the nesting sites meets another of the gross environmental requirements of these birds, namely, the presence of dependable and readily available food sources. The third of the eagle's gross requirements is freedom from human disturbance or intervention. All of the known Yellowstone nests occur in living coniferous trees. There appears to be no preference for a given species of conifer. The nesting tree is characteristically the largest or stoutest in the immediate surroundings. The only competitive interaction with another avian species observed involved American Ravens harassing adult eagles near nests of the latter species.



1595

The entire population of bald eagles roosted in four well defined roost sites. Two are at high elevations in Douglas fir stands and two are on the valley floor in introduced black willow trees (Salix nigra). The mountain roosts receive the greatest amount of use in both numbers of birds using the roosts and number of nights the roosts are used. In excess of one hundred bald eagles were observed on these desert wintering grounds. Unlike other wintering concentrations of bald eagles, these birds are not in association with a body of water. Fourteen species of raptors and two corvid species were seen in the area; various levels of interaction with the bald eagles were seen. Pellet analysis, prey remains, and field observations confirm that black-tailed jackrabbits were the main food source; however, they suggested that a large portion of these rabbits were scavenged.

1596

Second-hand reports noted the kind of trees used for hawk nests; 44% coniferous (Abies concolor, Juniperus scopulorum, Picea sp., Pseudotsuga menziesii), 21% cottonwood (Populus angustifolia), 12% maple (Acer grandidentatum, A. glabrum), 12% oak (Quercus gambelii), and 12% four other deciduous trees (Acer negundo, Prunus virginiana, Salix sp., and "a bush").

Platt found 85% of his 27 nests in conifers, but 65% of the conifers used were in small groves in the midst of a deciduous stand, not in predominantly coniferous stands. Of the four nests in deciduous trees, only one was situated in a tree of the predominant species around the nest site. No nests were found in lone trees or even in open stands. Nest sites were characteristically in dense stands with a well-developed canopy, but below the top of the canopy. Nest trees consistently had dense foliage; conifers are evidently selected for this reason. Two of the deciduous trees used were diseased, with abnormally dense growth. Two trees growing with their trunks nearly touching were used in three instances. The most common nesting site found consisted of grouped or scattered conifers in a stand of taller deciduous trees.

1958

The study area was located in Albany County, Wyoming, but the Laramie Plains region within a 56-km radius of Laramie was investigated most intensively. General physiography of the Laramie Plains is open rolling grassland, sometimes fairly dense with scattered dwarf shrubs.

Thirteen pairs of golden eagles were located from January 1974 through May 1975, and a 14th pair in August 1975. Eagle pairs on or near ranches nested successfully near human activity. Clutch size varied between one and two eggs, but no more than two. Nine pairs of eagles laid 17 eggs for an average of 1.88 eggs per pair. In 1974, eggs in three nests were laid in the first and second week of April and did not hatch until the third or fourth week of May. In 1975, eggs in nine nests were laid in the third or fourth week of March, and in six of these nests, eggs hatched in the first or second week of May. Maximum length of incubation was 43 days. Fledging success was 0.51 young per pair, including unsuccessful nesting attempts. The two most common prey animals found in eyries were whitetail jackrabbits and Richardson ground squirrels. Animals identified from analysis of adult eagle pellets obtained during pre-fledging indicated that some adults fed upon carrion or killed some mammals that were not observed in eyries. There was some correlation between numbers of mammals versus waterfowl observed while censusing, and numbers of mammals versus waterfowl found in nests. However, censusing along transects at five nests did not indicate positively that golden eagles preyed upon those species present in greatest numbers.

A table of the food habits of nesting red-tailed hawks is available.

## 1600

In 1967 the red-tailed hawk laying dates ranged from 11 April to 8 May; hatching dates ranged from 18 May to 10 June; brood departure dates ranged from 26 June to 13 July. Of 55 nests used by red-tailed hawks located during the two years of study, 41 (74%) were in cottonwood trees, four in Douglas firs (Pseudotsuga menziesii), three on cliffs, three in dead snags, two in quaking aspen (Populus tremuloides), one in an Engelmann spruce (Picea engelmanni), and one in a limber pine (Pinus flexilis). Distances between adjacent nests ranged from 3.1 miles to 0.2 mile and averaged 1.3 miles.

Fifteen active great horned owl nests were found. Thirteen (86%) of the nests were in cottonwood trees, one in a Douglas fir and one on a cliff. Eight owls nested in abandoned hawk (Buteo) nests, four in abandoned black-billed magpie (Pica pica) nests, one in an abandoned golden eagle eyrie, one in an abandoned common crow nest (Corvus brachyrhynchos), and one on a cliff.

Red-tailed hawk to great horned owl nest ratio was 3:1. Red-tailed hawks that nested close to great horned owl nests were not successful in fledging young. Minimum egg counts at 22 red-tailed hawk nests averaged 2.9. Minimum egg counts at six great horned owl nests averaged 2.2.  $1.7 \pm 0.2$  young fledged per successful nest in this study. 1.2 owls fledged per nesting attempt recorded in this study.

## 1601

The area under study was an 81 km<sup>2</sup> segment of a river valley in the Rocky Mountains of northern Colorado. This river valley, at an elevation of 2460 to 2550 m. contains extensive stands of lodgepole pine (Pinus contorta) interspersed with quaking aspen (Populus tremuloides). Along the river bottom are open sage (Artemisia) flats with willow (Salix) thickets bordering the river's edge. In 1974, six active nests were found in the study area, for a nesting density of one nest per 13.3 km<sup>2</sup>. The closest two nests were 2.4 km apart, indicating a higher density may be possible under certain conditions. The closest two nests in 1975 were 0.8 km apart.

## 1606

It is this writer's opinion that if proper roosting habitat is not available near their feeding grounds, the birds will commute great distances to seek it. In studies of the bald eagle of the Midwest, roosting areas were found to be available near the feeding areas along with hunting perches. Here on the Bear River marshes this is not the case and the high mountain passes provide the only suitable roosting places for eagles.

## 1609

Carriion appeared to be an important food source for the wintering eagles. Data strongly suggested that bald eagles preyed upon black-tailed jackrabbits.

This study contains information related to the nesting ecology of the ferruginous hawk (Buteo regalis) in Utah. The focus was on distribution within the study area, density and nest sites. Observations on territorial behavior, feeding mechanics, nest behavior, hunting techniques, and mortality were also included. During the two year (1967-1968) study 21 pairs of ferruginous hawks were located, for an average density of one pair per 15.4 square miles. A smaller study supported 11 pairs for an average density of one pair per 7 square miles. Nests were most often located on the ground (52% of all active and 64% of all unoccupied nests). Nest composition was shown to reflect the surrounding vegetation in composition and density. Mammals composed the bulk of the hawk's diet with black-tailed jackrabbits and kangaroo rats comprising 74% of the total prey. Proximity of nest to neighboring pairs was dependent upon direction of nest exposure. Nests exposed to the same hunting areas were constructed no closer than 1.3 miles, whereas nests facing different hunting areas were constructed as close as 0.4 miles apart. Other information related to nesting biology is contained in this report.

## 1612

Food habits of common mergansers (Mergus merganser) were examined through the analysis of 67 stomach samples taken from birds collected. The birds were collected in the Northcentral United States during 1966-1968. The gizzard shad (Dorosoma cepedianum) proved to be the most important food item in the diet of these birds.

## 1622

Four species of owls, (1) great horned, (2) long-eared, (3) burrowing and (4) barn owls were studied in northcentral Colorado from 1966 to 1970 to determine niche segregation in feeding ecology. Great horned owls preyed on the widest variety of species, with Sylvilagus being most important in biomass consumed. Long-eared owls fed on a much smaller array of prey, almost entirely mammalian, with Peromyscus and Microtus the most important. Prey of burrowing owls included insects as most numerous but mammals contributed more biomass. Barn owls fed largely on small mammals, with Microtus most important. The study was done on a portion of Larimer County and Pawnee National Grassland in Weld County. The area was characterized by short-grass prairie, with bluegramma (Bouteloua gracilis) and buffalo grass (Buchloe dactyloides) as dominant grasses. The Larimer County area has some farmland, both wet and irrigated, bordered by hogbacks on the west. These hogbacks were covered with shrubs, chiefly mountain mahogany (Cercocarpus montanus) and skunkbush (Rhus trilobata).

Much overlap existed in prey consumed by the four species of owls considered, but each owl specialized on different groups and sizes of prey.

## 1625

This study described the nesting ecology of the great horned owl, Bubo virginianus, in the desert regions of westcentral Utah. Study aspects included population and distribution as determined by the location of all active nest in a unit area; territoriality as determined by observations from constructed blinds and sighting information; and predation as demonstrated by a tabulation of prey remains found in nests and analysis of pellets removed from the nest sites. Data were gathered for a period



(1625)

of two nesting seasons, the springs of 1967-68, in the Thorpe and Topliff Hills of Utah and Tooele Counties, Utah.

Owl nesting densities were found to be .36 nest per square mile in 1967 and .40 nests per square mile in 1968. Nest sites included cliff lines, abandoned quarries, and junipers. Cliff nests occurred most often, with the eggs deposited either on bare rock or in old raven, red-tailed hawk, or ferruginous hawk nests. Nesting pairs often ranged over one mile from the nest site. These owls apparently tolerate the close nesting of diurnal avian predators, but not other owls. The major foods proved to be, in order of importance, black-tailed jackrabbits, desert cottontails, and kangaroo rats. Other biological data are contained in this study.

1628

On 25 January 1975 a long-eared owl (Asio otus) roost was discovered on the south end of Walter's Island of the Snake River, at Walter's Ferry, Canyon County, Idaho. The pellets were collected in plastic bags, later soaked in water and then dissected. The prey remains were identified and the individuals counted. Microtus comprises the highest percent of the owl's diet. The second most frequent prey consumed was Dipodomys ordi, third and fourth by Peromyscus maniculatus and Mus musculus, respectively. With the exception of Dipodomys, all prey species were found on the islands. Trapping efforts located a population of Dipodomys 0.3 km west of the island in an open field. Our prey data tend to support those of Maser et al. (1970, Murrelet 51:29-33), who record the lowest prey species diversity for the long-eared owl as compared to the great horned owl (Bubo virginianus) and short-eared owl (Asio flammeus).

1635

Movement trends and cover preferences of 13 ring-necked pheasant (Phasianus colchicus) hens, 8 of which produced broods, were studied by radiotelemetry from June to October in 1969 and 1970 in South Dakota. The average minimum home range size was 90 acres. Home ranges were smallest during the peak of hatch (15-30 June) and in October, and largest during the sown small-grain harvest (16-31 August). Alfalfa was the most extensively used cover type both day and night, and was preferred in all months of study. Sown small-grain fields, corn fields, and shelter belts were intermittently preferred for nesting or roosting.

1638

The objectives of this study were to compare ring-necked pheasant (Phasianus colchicus torquatus) nesting use and nesting success in various legumes, grasses, and mixtures of these plantings.

The investigation began in April, 1964, and was completed following the field season of 1971. Pheasants in enclosures were free to choose nesting cover types and treatments so that results indicated vegetative cover types suitable for roadside plantings as a means of enhancing pheasant habitat in Colorado.

A 14-acre tract was subdivided into four quadrats by perimeter and cross fences. Twelve triangular-shaped, experimental, cover plots were established in two replicates of each cover type per quadrat, and cover types tested were established randomly.

Each of the four quadrats were stocked with wild-trapped, banded, and wing-clipped pheasants. Nest searches were conducted, two each year in 1967 and 1968, and three each year, 1969 through 1971. Nests located were recorded and removed to encourage renesting by the hen pheasants.

Results indicated that significant preferences for individual cover types could be shown only for 1969 and 1970, when 66 and 80 nests, respectively, were recorded. The number of nests found in 1967, 1968, and 1971 were 54, 33, and 48, respectively. Results indicated that three cover types, alfalfa-crested wheatgrass mixture, intermediate wheatgrass, and tall wheatgrass have definite possibilities for replacing weedy cover (volunteer forbs) along roadsides for pheasant nesting cover. Based on success in nesting attempts, intermediate and tall wheatgrass are considered suitable substitutes for alfalfa and alfalfa-crested wheatgrass.

## 1643

A study of the summer habits and habitat of chukar partridge in northern Utah was conducted on the west slopes of Bear River Range, Cache County, Utah.

Chukars ranged from 4800 to 8500 feet altitude and were generally found between 5500 and 7500 feet altitude. Chukars occupied steep extensive slopes within 5500 to 7500 feet altitude. Direction of slope did not influence selection by chukar partridge.

The slopes consistently occupied contained big sagebrush, black sagebrush, sticky rabbitbrush, beardless bluebunch wheatgrass, cheatgrass brome and/or mulesear-wyethia

By mid-summer chukars began to congregate near free water sources.

## 1653

From 11 November 1971 through 15 February 1972, 13 counts of wintering birds of prey were made in the grasslands and wheatlands east of Colorado Springs and Fort Collins, Colorado. Two routes were followed, the first, extending south and east from Colorado Springs, was approximately 150 miles long, involving a total observation area of approximately 48,000 acres. The second route, beginning 8 miles east of Fort Collins, was 54 miles long and involved 17,280 acres. A total of 1,048 miles was driven during the censuses. A total of 306 raptors were seen (one every 3.4 miles). Enderson (op. cit.) counted raptors along nearly identical routes about 10 years ago, traveling 1,675 miles. He recorded marsh hawks and pigeon hawks twice as often as the authors did. They recorded sparrow hawks 1.7 times more often, and ferruginous hawks 2.1 times more often than he did. In this survey, golden eagles, second only to rough-legged hawks in abundance, were seen 2.9 times more frequently than a decade ago.

## 1660

This paper includes data concerning phenologies, general life histories, population densities, biomasses, reproductive performances and food habits of raptors which nest on the shortgrass prairies of Colorado. The data were collected between

(1660)

1 May 1969 and 1 September 1972. Also included are analyses and/or discussions of the following: 1) field techniques and definitions of nesting parameters, 2) the effects of historical and current activities of man on nesting performances, 3) comparisons of current and past population levels of selected species, 4) the effects of weather conditions on nesting phenologies and successes, 5) differential use of summer habitats and nest supports, and 6) the importance of interspecific differences in nesting phenologies. Finally, a thorough, long-term study of population dynamics, management techniques and emergency conservation measures applicable to raptorial birds is outlined in detail.

1662

A 56 sq. mile study area on Pawnee National Grasslands was counted 12 times. 7-27 diurnal raptors were observed on individual days. The Golden eagle (Aquila chrysaetos) was the most frequently observed species (32.6%); the rough-legged hawk (Buteo lagopus) and the marsh hawk (Circus cyaneus) each accounted for about 20% of the observations. The other species were seen in lesser numbers.

1671

The killdeer (Charadrius vociferus) occupies the shortgrass prairie in summer as a nesting bird. The breeding population at the Pawnee National Grassland appears to be considerably smaller than the local breeding population of the mountain plover (Eupoda montana).

Through food habits studies it was found that 97.2% of the killdeer's food was composed of insects and other animal matter, and 2.3% of seeds. Insects found to be prominent in the diet at several habitats included grasshoppers, weevils, caterpillars, May beetles, and crane flies.

The objectives of the study were to present specific data on the diet of the killdeer, and to compare the use of the shortgrass prairie food resources by the killdeer and its relative, the mountain plover.

1672

The diet of the mountain plover (Eupoda montana) in Weld County, Colorado, was studied between the dates May 4 and August 11. Thirteen birds, eight adult and five juveniles, were available for analysis of stomach contents. Identification of 90 food taxa and estimates of dry weight for each type of food showed the diet to consist of 99.7% arthropods and 0.3% seeds. The most important food types were ground-dwelling beetles (60.0%), grasshoppers and crickets (24.5%) and ants (6.6%). The most important genus eaten was Eleodes (a darkling beetle) comprising 22% of the diet. Diets of juvenile and adult mountain plover revealed that juveniles ate smaller insects such as ants, bees, wasps and parasites, leaf and flower beetles, and leafhoppers in slightly greater proportions than did adults. Adults, however, ate larger insects such as caterpillars, billbugs, and darkling beetles in greater proportions than did juveniles.

1689

Merriam's wild turkeys, introduced in the Salmon River breaks country of central Idaho in 1961, 1962, and 1963 were studied in 1966 and 1977. The total study area was 597,716 acres of steep terrain between 1,100 ft. to 9,300 ft. in the Snake and Salmon River drainages. Major vegetation zones are spruce-fir, cedar-hemlock, Douglas fir, Ponderosa pine and bunchgrass. A Lincoln index population estimate for the study area was 432 birds. Ponderosa pine was the predominant tree species in 73% of the sightings, and 78% of the sightings were between 2000 and 4000 ft. The most commonly physiographic features used were basins (29%) and stream bottoms (17%).

Total acreage estimate for the Ponderosa pine forest type was 59,057 acres or 10% of the study area. The population density of turkeys was estimated as 1/137 acres in this Ponderosa pine forest type.

1677

Breeding densities and migration periods of common snipe in Colorado were investigated in 1974-75. Sites studied were near Fort Collins and in North Park, both in north central Colorado; in the Yampa Valley in northwestern Colorado; and in the San Luis Valley in south central Colorado.

Estimated densities of breeding snipe based on censuses conducted during May 1974 and 1975 were, by region: 1.3-1.7 snipe/ha near Fort Collins; 0.6 snipe/ha in North Park; 0.5-0.7 snipe/ha in the Yampa Valley; and 0.5 snipe/ha in the San Luis Valley. Overall mean densities were 0.6 and 0.7 snipe/ha in 1974 and 1975 respectively. On individual study sites, densities of snipe ranged from 0.2 to 2.1 snipe/ha. Areas with shallow, stable, discontinuous water levels, sparse, short vegetation, and soft organic soils had the highest densities.

Twenty-eight nests were located having a mean clutch size of 3.9 eggs. Estimated onset of incubation ranged from 2 May through 4 July. Most nests were initiated in May.

Spring migration extended from late March through early May. Highest densities of snipe were recorded in all regions during 10-23 April. Fall migration was underway by early September and was completed by mid-October with highest densities occurring about the third week in September. High numbers of snipe noted in early August may have been early migrants or locally produced juveniles concentrating on favorable feeding areas.

1691

The breeding distributions of the western race of the Nashville warbler (Vermivora ruficapilla ridgwayi) and Virginia's warbler (Vermivora virginiae) in western North America were reviewed and delineated. Distributions show the exclusion of the former but the inclusion of the latter in Wyoming. The Virginia's warbler enters the state in the extreme southwest corner of the state.

1694

Waterfowl production on a spring-fed salt marsh in Utah was studied in 1966, 1967, and 1968 on Fish Springs National Wildlife Refuge. The 18,000 acre refuge is located in west central Utah and is composed of desert upland, Distichlis, Juncus meadow and Juncus border, Phragmites, Eleocharis meadow, emergent marsh, and submerged communities.

Populations of breeding ducks averaged approximately 900 pairs a year in 1967 and 1968. Mallards, cinnamon teal, and red-heads comprised about 80 percent of these birds. Nesting densities averaged about 1 nest/acre during the two years.

1696

Waterfowl production on the stock-water reservoirs in the Mill River Association Allotment, Phillips County, Montana, was studied during 1974 and 1974 to evaluate the influence of rest-rotation grazing management. The breeding pair population increased by 42 percent from 190 to 270 pairs, and brood production increased by 50 percent, from 127 to 191, during the study. Breeding pairs, brood and species diversity increased on the allotment since 1970. Changes in the distribution of breeding pairs

and broods suggested a positive response by waterfowl to the previous year's rest treatment, and negative response to heavy grazing pressure during the late summer and fall of the previous years. Waterfowl responded positively to rest and deferred treatments, and negatively to spring grazing during the current season. Shoreline and upland transects established during 1974 indicated that new vegetation accumulated most rapidly in those pastures deferred from early season grazing. Regrowth, following relief from grazing, contributed to the accumulation of residual vegetation.

## 1697

Coot and duck nesting habits and productivity were studied. The study area was located in Weber and Davis Counties, Utah.

Total breeding pairs of coots exceeded those of ducks, but the ratio of coot pairs to 100 duck pairs varied from 67 to 225 on the five areas observed. There seemed a definite relationship between coot nesting densities and the amount of open water in proportion to available nesting cover. Coot nest densities increased as the proportion of open water to available nesting cover increased.

In contrast, there seemed an inverse relationship between duck nest densities and the ratios of open water to cover for the areas upon which coot nesting was not increased by artificial nest destruction.

All but two of 480 coot nests were in emergent vegetation. All 70 diving duck nests were in emergent vegetation, whereas 65 percent of the 88 dabbling ducks were in emergents and 35 percent in upland cover.

Cattail (Typha spp.) was dominant on all five areas. Saltgrass (Distichlis stricta) was next in abundance, greasewood (Sarcobatus vermiculatus) third, and alkali bulrush (Scirpus paludosus) fourth.

## 1700

The authors have traced the origin of birds passing through the Bear River Refuge, and the dispersion of birds banded at the Refuge. Band recoveries and returns provide the data for this study. Distribution maps indicating the distribution of each species banded at the Refuge were provided.

## 1701

Cover types were evaluated at Utah's Bear River Waterfowl Refuge to determine each type's value to different species of waterfowl.

Hardstem bulrush (Scirpus acutus) cover type constituted only 3 percent of the available nesting vegetation, 30 percent of the Canada goose nests and 39 percent of the duck nests were found in it, the latter averaging 9.6 to the acre.

Alkali bulrush (Scirpus paludosus) was found to be the least acceptable of any of the available cover types. Five percent of all the duck nests were located in this cover type making an average of only 7 nests to every hundred acres.



Saltgrass (Distichlis stricta) composed 26 percent of the marsh vegetation. More than one-fourth of the Canada goose nests and 22 percent of the duck nests were located in this cover. The duck nests averaged 1.3 to the acre.

The cattail (Typha latifolia and T. angustifolia) composing 6 percent of the marsh vegetation, held 94 duck and 21 goose nests. The duck nests averaged 1 to every 2 acres. The principal ducks using cattails for nesting sites were the redhead and the ruddy.

Cane (Phragmites communis) was determined to have a density of 3.2 nests to the acre.

Nests of 230 ducks, or 9 percent of the total were found among willows. The density of nests was 11.0 to the acre. The gadwall made the greatest use of the willow environment, 19 percent of its nests being located therein, the nests averaging 8.5 to the acre.

Nests of the gadwall found in this cover numbered 170, or 18 percent of the total for this species, and averaged 8.1 to the acre.

Hardstem bulrush forms the most and alkali bulrush the least valuable nesting cover in this area, considering all nesting duck species.

The order of importance of the various cover types studied to the different duck species is:

Gadwall: Willow, weeds, hardstem bulrush.  
Cinnamon teal: Weeds, hardstem bulrush, other sedges.  
Redhead: Hardstem bulrush, cane, cattail.  
Mallard: Hardstem bulrush, willow, cane.  
Pintail: Willow, hardstem bulrush, weeds.  
Ruddy: Hardstem bulrush, other sedges, cattail.  
Shoveler: Weeds, hardstem bulrush, saltgrass.

Saltgrass and hardstem bulrush furnish natural bases for Canada goose nests, but alkali bulrush and cattails have to be supplemented by muskrat houses.

The greater number of nests (more than two-thirds) were located in cover types that form much less than 10 percent of the marsh vegetation.

#### 1702

The use made of the several nesting environments was determined by recording the number of nests found in each.

Hardstem bulrush comprises 3% of the vegetation of Unit II and is found both bordering the upper channels and as patches in the lower marsh. The density averages about 1.5 culms per linear foot. The Canada geese were reported as utilizing this plant as a base upon which to build their nests, but the ducks were found to use it only for concealing cover or nesting material.

Cover of hardstem bulrush was extensively used by all duck species. Of all the nests found, 39% were in it. The redhead and the mallard ducks made the greatest use of this type, each having 65% of their nests therein.

A total of 134 nests, representing 5% of all the nests located were found in alkali bulrush.

Ninety-four nests or 4% of the total number were in cattails, and, as with alkali bulrush, the principal users were the ruddy (7 nests, 14%) and redhead (40 nests, 12%).

Saltgrass is the second most extensive cover plant occupying 26% of the marsh area in Unit II.

Nests of 525 ducks, representing 22% of the total, were found in saltgrass. It was of most importance to the shoveler (24 nests, 65%), to the cinnamon teal (261, 50%), and to the pintail (96, 46%).

Cane (*Phragmites*) is one of the less abundant plants, occupying less than 1% of the marsh. The broken stems were commonly used by Brewster's egret and other herons in nest construction. Sixty-eight duck nests, 3% of the total, were found in cane.

The number of nests found among willows totaled 230 or 9%. The chief nester in this cover was the gadwall with 178 nests, 19%.

The weedy species are used chiefly by the gadwall which had 170 nests or 18% of its total in this type. It is apparent that of the four major cover types, hardstem bulrush was by far the most valuable for nesting. The fact that the 3% area of this cover harbored 39% of the nests in contrast to the 59% alkali bulrush with only 5% of the nests, accounts for the startling difference between percent acre-use difference between percent acre-use ratios of the two cover types. Of the other extensive cover types, saltgrass and cattails were determined as having percent acre-use ratios of 1.68 and .66, respectively, which means that both are far below hardstem bulrush in cover value.

It is believed that the .8 nests per acre found on the area represent an average where extensive tracts of suitable cover are available on the refuge. If we assume that there were 3,000 nests in the area, the density would be 1.0 nests per acre.

Though other areas were searched with the same thoroughness, approximately 95% of all the duck nests found were within forty-five feet of channels.

No definite correlation of cover types with clutch size was found. The success of nesting was surprisingly high for four species, the gadwall, cinnamon teal, pintail, and shoveler hatching between 80 and 85% of all the eggs laid.

The densest population, 79 nests per acre, was found among weeds and willows of the upper march.

#### 1707

Pygmy nuthatch and red crossbill utilize pine seeds extensively and thus may be competition of white-headed woodpeckers for this resource. Hairy woodpeckers foraged near the white-headed woodpeckers and appeared to use them as a means of locating seed-containing cones.



## HISTORICAL ACCOUNTS

1805-1840

## Wyoming Fur Trade Era

Francois Antone Larocque: 1805Hazlitt (1962)<sup>a</sup>Northern Wyoming<sup>b</sup>

The earliest note on the birds of Wyoming seems to be that of Francois Antoine Larocque, a French-Canadian fur trader. In 1805 the Northwest Fur Company of Canada sent Larocque and two companions south from a fort on the Assiniboine River to establish a fur trade with the Indians in the Rocky Mountains. The three men crossed the present United States-Canadian border about half-way between the eastern and western borders of the present state of North Dakota and continued south to the Missouri River. From there, they gradually worked their way west and south across the drainages of the Little Missouri, Powder and Tongue rivers. Larocque, at least, traveled with a band of Indians into the Powder River Basin of Wyoming. His journal entry for August 13, 1805, reads:

"We camped at noon on a little tributary of the Tongue river (probably a few miles west of present town of Sheridan) . . . . I saw a few crows today and they are the only birds that I have met since my departure from the Missouri except a few woodpeckers."

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<sup>a</sup>Primary reference, other references cited in text.

<sup>b</sup>Geographic region(s) of state emphasized.

The next day Larocque continued north and west. He wrote:

" . . . we crossed several little streams of water which all empty into the Tongue River . . . there were no beaver dams but I saw a few cranes."

Larocque continued north along the eastern flank of the Big Horn Mountains and soon left what is now Wyoming.

Wilson Price Hunt, leader of the "Overland Astorians": 1811

Rollins (1935)

Central Wyoming

On March 1811, 65 men employed by John Astor's Pacific Fur Company set out from St. Louis, Missouri, under the leadership of Wilson Price Hunt, to make their way overland to the Columbia River. They traveled by boat up the Missouri River as far as the Arikara Indian villages near the mouth of the Grand River. Here they purchased horses and began the overland part of their journey. They traveled southwest past the Black Hills, around the southern end of the Big Horn Mountains, then west up the Wind River. On the Popo Agie River on September 11, Hunt noted, " . . . numerous flights of robins and of other small birds." They continued up the Wind River and crossed Union Pass onto the upper Green River. Here, Hunt recorded, "Geese and ducks are very common." Although the party spent several more days in what is now Wyoming, Hunt did not again mention any birds.

Until 1840, virtually all of the white men who came to Wyoming came for the same reason as Larocque and the Astorians--to engage in the fur trade. By the early 1830's Wyoming was the hub of the

vast Rocky Mountain fur empire. Although the mountain men must have been intimately acquainted with the area now called Wyoming, they are a poor source of information about its early bird life. Unlike Larocque and Hunt, few of them kept journals where details about small things like birds might have been recorded. Osborne Russell, a 10 year veteran of the fur trade, noted in his own journal (Russell 1955) that he had ". . . never known but one Rocky Mountain (eer) to keep a regular journal . . ." Some of the mountain men did later write or dictate accounts of their adventures in the fur trade, but these reminiscences seldom mention birds. The only birds they ever noted were geese, ducks, or grouse, and only if they ate them. Since they considered a bird virtual starvation fare, they were seldom eaten. Russell (1955) kept detailed notes on the beaver and large mammals, but he mentioned birds only once when he was forced to eat a duck for breakfast because he had no other meat.

Nathaniel J. Wyeth: 1832-1833

Young (1899)

Eastern Wyoming

In late 1831 Nathaniel J. Wyeth, a Cambridge, Massachusetts, ice dealer, organized a small trading company to operate in Oregon Territory. Wyeth had never been west, and he knew little of the realities of the mountain fur trade, but he felt sure that Yankee business ingenuity could overcome any difficulties. To reduce the high costs of transporting goods to the mountains by pack train, he sent most of his supplies to the Columbia by ship around Cape

Horn. He planned to establish a series of posts in the interior and along the Columbia River to serve as shipping points through which furs could be sent out of the mountains by sea.

Wyeth was also interested in natural history. Before starting on his western journey, he consulted his friend Professor Thomas Nuttall of Harvard University, a noted American botanist and ornithologist, and agreed to collect specimens for him.

The Wyeth party of 24 men left Independence, Missouri, on May 3, 1832, in company with the caravan of the Rocky Mountain Fur Company led by veteran mountain man William Sublette. Sublette was taking goods to the annual fur trade rendezvous in Pierre's Hole (Teton Basin, Idaho). The caravan followed the general route west which later became famous as the "Oregon Trail" After they crossed South Pass in western Wyoming, they left the trail and headed northwest to the rendezvous.

Wyeth's journal contains many remarks on the plants and animals he saw along the trail. Two journal entries refer to birds he saw in Wyoming. On June 16 along the North Platte River in eastern Wyoming he noted ". . . plover and other marsh birds are common and some 2 or 3 kinds of Gulls." On July 2 he saw "King fishers" along a stream west of South Pass.

After the rendezvous, Wyeth continued on to Fort Vancouver where he spent the winter. Here he learned that his ship had sunk, and his first western trading venture was bankrupt. In February he started east. When spring came, he began to collect plants for Nuttall, but his attempts to preserve bird skins

failed because of the moisture and warmth. He stopped for a time at the rendezvous of 1833 on the upper Green River. Here, he signed a contract with representatives of the Rocky Mountain Fur Company to deliver trade goods to the next year's rendezvous.

When Wyeth reached Boston, he took the few plants he had collected to Nuttall and told him of his plans for a second trip west. This time Nuttall decided to collect in the vast, unexplored West himself. He resigned his post at Harvard (Graustein 1967) and prepared to join Wyeth's second expedition.

Thomas Nuttall and John Kirk Townsend with Nathaniel Wyeth: 1834

Townsend (1839)

Central Wyoming, along Oregon Trail

On the way west Nuttall stopped in Philadelphia and attended several meetings of the Philadelphia Academy of Sciences (Beidleman 1957). At one of the meetings he met a promising young ornithologist, John Kirk Townsend, and promptly invited him to join Wyeth's second expedition. Townsend received modest financial assistance for his western venture from the academy and the American Philosophical Society. Each gave him \$100 in return for collections which he was to make for them (one specimen of each object collected) (Graustein 1967). Wyeth also provided some supplies for the two naturalists when they reached St. Louis (Young 1899).

The most valuable record of the trip is Townsend's narrative published in 1839. Unfortunately, Nuttall's journals have never been found. Nuttall did include many of his observations on

western birds in the revised edition (1840) of his popular handbook on land birds. John James Audubon, the famous naturalist-artist of the 19th century, quoted many of Nuttall's and Townsend's observations on western birds in the last two volumes of his Ornithological Biography (1831-1839) and in the more popular version of this work, The Birds of America (1840-1844, republished 1967).

Wyeth's second expedition of 70 men and 250 horses left Independence, Missouri, on April 28, 1834. They followed approximately the same route Wyeth had taken in 1832. Even before they reached Wyoming, the two naturalists discarded their spare clothing and shaving kits to make more room in their packs for the new plants and animals which they were collecting every day.

On the evening of May 31 the party camped on the North Platte River near the present Wyoming-Nebraska border. The next morning Townsend and Nuttall collected birds in the cottonwood groves along the river. Townsend wrote:

"In the morning, Mr. N. and myself were up before the dawn, strolling through the umbrageous forest, inhaling the fresh, bracing air, and making the echoes ring with the report of our gun, as the lovely tenants of the grove flew by dozens before us. I think I never saw so great a variety of birds within the same space. All were beautiful, and many of them quite new to me; and after we had spent an hour amongst them, and my game bag was teeming with its precious freight, I was still loath to leave the place, lest I would not have procured specimens of the whole.

What valuable and highly interesting accessions to science might not be made by a party, composed exclusively of naturalists, on a journey through this rich and unexplored region! The botanist, the geologist, the mammalogist, the ornithologist, and the entomologist, would find a rich and almost inexhaustible field for the prosecution of their inquiries . . ."

Later that day the party reached the confluence of the Laramie and North Platte rivers where they found some of Sublette's men building a fort (later called Fort Laramie). Townsend shot several Sharp-tailed Grouse here (Audubon 1967). From June 2 to 7 they followed the trail up the valley of the Platte. Townsend and Nuttall saw many birds with which they were not familiar. Large flocks of Lark Buntings were common until they reached the Laramie Range (Nuttall 1840). Western Kingbirds, Bullock's Orioles, Red-shafted Flickers and Western Tanagers frequented the cottonwood groves along the river (Audubon 1967). Nuttall watched a Say's Phoebe hawking for insects from a perch on a pile of rocks. Yellow-headed Blackbirds nested in a marsh near the river. They began to see Mountain Bluebirds and small flocks of Sage Grouse. Townsend shot an old cock for dinner, but the meat was so bitter the men could not eat it (Nuttall 1840).

On the 7th they passed Red Buttes and cut across to the Sweetwater River. Two days later they camped near Independence Rock. Here Townsend recorded seeing

" . . . great numbers of a beautiful brown and white avocet, (the *Recurvirostra americana* of ornithologists). These fine birds were so tame as to allow a very near approach, running slowly before our party, and scarcely taking wing at the report of a gun. They frequent the marshy plains in the neighborhood of the river and breed here."

The next day Nuttall found a nest of the Horned Lark (Audubon 1967), ". . . a small depression on the ground . . . made of bent grass, lined with coarse bison hair." Townsend collected a new species of plover along the Sweetwater which he named the Rocky Mountain Plover (now called the Mountain Plover, Charadrius



montanus) (Townsend 1837). The caravan continued up the Sweet-water and must have crossed South Pass, although Townsend does not mention it. By June 15 they were on the Big Sandy River on the west side of the Continental Divide. Here Townsend shot a "beautiful new species of mocking bird" (Sage Thrasher, Oreoscoptes montanus) and commented on the general scarcity of birds in the area. On June 19 they reached the Green River, and Wyeth ordered an early halt. Townsend took his gun and left camp to look for new birds. When he returned in the evening the camp was deserted, ". . . the place being occupied only by a few hungry wolves, ravens, and magpies, the invariable gleaners of a forsaken camp." The ornithologist mounted his horse, which had been left tied in the abandoned camp, and followed the trail of the rest of the party. When he arrived at the new camp he discovered that, in fording a stream, his coat with the second volume of his journal in the pocket had come off the saddle and been washed away. The lost journal began with his arrival at the Laramie Range and contained ". . . descriptions of several new species of birds . . ." and their habits. Townsend tried to fill in the large gap in his notes by copying from Nuttall's journal, but the loss of his journal, covering almost his entire crossing of Wyoming, may account for the meager comments on the birds of the state in his narrative.

On June 22 Wyeth's brigade arrived at the fur trade rendezvous, held on Ham's Fork of the Green River in 1834. They remained there 11 days. Wyeth suffered a serious financial loss when the Rocky



Mountain Fur Company refused to honor the contract for supplies they had made at the previous rendezvous. William Sublette had beaten Wyeth to the rendezvous by a few days and persuaded the company to buy from him. Townsend was sick with a fever, and he spent most of the time during the rendezvous lying in his tent listening to the drunken debauchery of the trappers and Indians. Nuttall (1840) noted the abundance of Violet-green and Cliff swallows nesting in the bluffs along the river, and he found a family of Rock Wrens in a ravine in the bluffs.

On July 2 Wyeth's party left the rendezvous and continued up Ham's Fork. They began to see Black-headed Grosbeaks along the stream (Audubon 1967) and Townsend commented on the abundance of Yellow Warblers. Nuttall (1840) heard the familiar song of the Veery from the thickets along the stream. Near the head of Ham's Fork they crossed the hills to the Bear River and followed that stream north into the present state of Idaho on July 5.

The caravan continued northwest across Idaho. Wyeth decided to build a trading post at the confluence of the Snake and Portneuf rivers and stock it with the trade goods left on his hands by the contract default. The stockade, which he named Fort Hall, was completed in early August. Wyeth left 12 men to run it, and the rest of the party, including the two naturalists, continued across Idaho toward the Columbia River. They reached Fort Walla Walla on the Columbia on September 5. Here they traded their horses for boats and continued down the river to Fort Vancouver.

In early December the two naturalists embarked for a winter

cruise to the Hawaiian Islands. They returned to the Pacific Northwest in April and spent the summer of 1835 collecting in that region. Nuttall again visited the Hawaiian Islands during the fall and winter of 1835-1836. He spent a few weeks in California after his second sojourn in the islands, then sailed for Boston around Cape Horn. He arrived in Boston in September, 1836.

Townsend finally left the Northwest in November, 1836. He also revisited the Hawaiian Islands and then proceeded to Chile before sailing for home. He finally arrived in Boston in the fall of 1837.

Shortly after Nuttall returned, he visited John James Audubon and gave him some notes on western birds and five new species of birds which he had collected (Audubon 1838). Audubon (1838) gratefully acknowledged Nuttall's contributions in the introduction to the fourth volume of his Ornithological Biography:

"Mr. Nuttall generously gave me of his ornithological treasures all that was new, and inscribed in my journal the observations which he had made respecting the habits and distribution of all the new and rare species which were unknown to me."

Townsend had also shipped part of his collection of western birds back to the Philadelphia Academy. When Audubon learned of the western birds, he went immediately to Philadelphia to see the collection for himself (Corning 1930). Audubon was extremely anxious to include illustrations and descriptions of the new species in his work on North American birds, but the academy members at first objected to doing anything with the specimens during Townsend's absence in the West. Eventually a compromise

was reached. A committee of academy members, including Nuttall and Audubon (Stone 1936), selected names for the new birds and prepared a paper in Townsend's name describing 12 new species of birds from the Rocky Mountains and the Pacific Northwest. This paper (Townsend 1837) was read before a meeting of the academy on November 15, 1836. After this, Audubon was permitted to purchase 93 duplicate skins for \$184 (Corning 1930).

The real contributions of Nuttall and Townsend to American ornithology are largely embodied in the volumes of Audubon's great work. Their identities as important contributors are to a great extent obscured by the fame of Audubon. Both Nuttall and Townsend gave Audubon many notes on western birds, and Audubon was not shy about asking for additional information. On October 26, 1837, Audubon wrote to his friend Edward Harris (Rhoads 1903) about Townsend, who had recently arrived in Boston. Audubon asked Harris to urge Townsend to forward a copy of all parts of his manuscripts pertaining to birds and to supply exact information about measurements, collecting dates and locations, and detailed descriptions of the natural history of each species. He also wanted Townsend to examine all of the illustrations of The Birds of America thus far printed and to make list of the species he had seen during his western travels.

Many of the birds collected by Townsend, including the types of the Mountain Plover and the Sage Thrasher, are in the collection of the Academy of Natural Sciences, Philadelphia (Stone 1899 a,b). The duplicate specimens which Audubon purchased are in the

collections of the academy and the National Museum of Natural History, Washington, D. C. (Stone 1899a).

#### 1834-1860

##### The Oregon Trail, Railroad Surveys and Military Road Era

After Townsend and Nuttall left the state in 1834, 22 years elapsed before any significant documented ornithological contributions were made in Wyoming. Lieutenant John C. Fremont of the Army Corps of Topographical Engineers led two government sponsored exploring expeditions across the state in 1842 and 1843 (Fremont 1843, 1845), but he did not collect birds and his journals contain few references to birds. In 1849 Captain Howard Stansbury of the Topographical Corps led an exploring and survey party across Wyoming on the Oregon Trail (Stansbury 1852). He returned along a new route through Bridger's Pass in southern Wyoming in 1850, but he does not seem to have collected birds in the state, although he did collect birds around the Great Salt Lake.

Between 1841 and 1866 an estimated 350,000 people crossed the state of Wyoming on their way to Oregon or California (Mattes 1969). Many of the emigrants kept diaries or journals, but few of them mentioned the bird life along the trail. The noise, confusion and dust created by the emigrants and their livestock may have driven birds and other wildlife away from the trail. In some places overgrazing and trampling of the vegetation eliminated avian habitats near the trail. At one point west of Fort Laramie, William Kelly, a California Forty-niner, was struck by the absence

of birds. He wrote (Kelly 1851):

"The country was broken and exceedingly undulating, sparsely covered with timber in the vicinity of streams, in which, curious enough, not a bird of any description was to be seen; nor had the notes of a feathered warbler saluted our ears since we left Laramie, though we passed through groves and dells, where one would think they would delight to dwell."

If any bird was mentioned by the prairie travelers, it was the Sage Grouse. Their first encounter with these grouse was usually in central Wyoming. The emigrants shot large numbers of these birds for food, but their palatability was debatable. Some travelers pronounced them delicious, while others complained of a bitter sage taste that rendered them inedible. Charles Geyer, a German botanist who followed the Oregon Trail across Wyoming in 1843, commented on the habits of the Sage Grouse (Geyer 1846):

"In the Artemisia bushes (wild-sage-plains of the Anglo-American travellers) lives a beautiful gallinaceous bird, the so-called 'sage-cock' (Tetrao urophasianus); as grey as the Artemisia itself, and the flesh of it as bitter too. It assembles in little flocks, seldom more than eight or twelve together, and lives, at least, generally, on the Artemisia leaves."

In 1846 Francis Parkman, the son of a prominent Boston family, followed the Oregon Trail west as far as Fort Laramie. Parkman spent most of the summer of 1846 traveling with a band of Oglalla Sioux in what is now southeastern Wyoming. The Oregon Trail (Parkman 1849), his account of that summer's adventures, was perhaps the most popular work on the early West published in the 19th century. Although the book is frequently quoted to illustrate the primitive abundance and variety of wildlife in the West, Parkman's journal (Wade 1947) is a more reliable source of

information. The book is an adventure story, written in the best Romantic tradition of the 19th century. Many scenes in the book are fictionalized. Parkman did note a few of the birds he saw while in Wyoming (Wade 1947), but his identifications are vague.

Some of the greatest pioneering work in American ornithology began in 1853 when Congress approved surveys of four potential railroad routes between the Mississippi River and the Pacific. The zoologists attached to these surveys collected an enormous number of western birds which they sent back to Spencer F. Baird at the Smithsonian Institution in Washington, D. C. Baird, with the assistance of John Cassin and George N. Lawrence, used these collections as the basis for a monograph on the birds of North America (Baird et al. 1858). Although none of the railroad surveys examined any routes in Wyoming, the ornithological report does include data from several other expeditions that did enter the state. Ironically, the first transcontinental railroad did cross southern Wyoming.

The role of Spencer F. Baird and the Smithsonian Institution  
in Western scientific collecting: 1850-1860

In 1850 Spencer Fullerton Baird was appointed Assistant Secretary and Curator of Natural History of the recently created Smithsonian Institution in Washington, D. C. (Goode 1897). Baird was keenly aware of the need for scientific material from the little known American West, but the new national museum had neither the funds nor the personnel to field its own expeditions. His solution was to have members of government exploring expeditions make



collections for the museum. He was instrumental in developing the close relationship that existed between the eastern scientific community and the government explorers in the 1850's. After his appointment, nearly every major government expedition included at least one competent collector. Baird had married the daughter of Colonel Sylvanus Churchill (Dall 1915), Inspector General of the Army, and possibly through the colonel's influence, had medical officers assigned to expeditions who would also serve as naturalists.

Young medical officers were usually ordered West immediately after they received their commissions as Assistant Surgeons in the Army Medical Corps (Hume 1942). There was a surgeon on every major government exploring expedition and one at every frontier post. These men were often exceedingly well-educated, not only in medicine but also in natural history, and they frequently spent their spare time collecting scientific specimens. In fact, some of them spent a great deal of time collecting and very little time ministering to the sick. Collectively they sent thousands of specimens back to the Smithsonian Institution.

Although most of the early Western collectors were medical officers, some had formal training in other fields. Not infrequently the topographical engineer of an expedition collected plants, animals or fossils. Occasionally, a scientist sponsored by an eastern university or scientific society went with an expedition. If no member of a proposed expedition was a competent collector, Baird or some other member of the Smithsonian staff often gave the potential collector a "crash course" on scientific collecting.

Baird's detailed instructions to collectors provide insight into the problems of collecting, preserving and transporting scientific specimens from the West to the East (Baird 1857a). His suggested list of equipment for a naturalist visiting unexplored country included several small square copper cans filled with alcohol (5 gallons per party) to preserve "wet" specimens (Baird recommended that tartar emetic be added to the alcohol to prevent people from drinking it.), parchment and paper labels, fishing lines, nets, seines, arsenic for preserving dry specimens, cotton or tow for stuffing, dissecting kit, plant press and extra absorbant paper, small collecting bottles, geologic hammer, a double-barrelled shotgun with shot sizes No. 3, 6, and 9, a rifle, insect pins, cork lined boxes, and ether bottles. All of them equipment was to be packed in two large leather panniers, supplied with back straps for throwing across a mule. Parcels of specimens were to be left at military posts so they could be sent to the coast or the frontier in returning trains of the quartermaster's department.

Baird (1857a) cautioned naturalists not to collect just the unusual:

"As the object of the Institution in making collections is not merely to obtain the different species, but also to determine their geographical distribution, it becomes important to have as full series as practicable from each locality. And in commencing such collections, the most common and abundant species should be secured first, as being most characteristic. It is a fact well known in the history of collections, that the species which, from their abundance, would be first expected, are the last to make their appearance."



With special reference to birds he wrote:

"In passing through the breeding ground of species of birds whose nidification and eggs are not known, attention should be paid to securing abundant specimens of nests and eggs. When possible, the skin of the bird to which each set of eggs may belong should be secured, as well as the skin of birds generally."

Bird skins were prepared then much as they are today. Cotton, tow or on occasion dried grass was used to stuff the skins. Powdered or liquid arsenic was used as a preservative. Finely powdered green vitriol or copperas was sprinkled on the feathers to keep out moths. Covering with tobacco leaves also worked.

A bird study skin is virtually useless without a label. Baird (1857a) recommended the following data be included on the label: total length (in inches) from bill tip to end of tail; distance between tips of outstretched wings; length of wing from carpal joint to wing tip; color of soft parts; sex, determined by dissection if necessary; date; locality; and name of collector. Unfortunately, Baird's instructions were not always followed, particularly in filling out labels. Dates were often omitted or incomplete and locations were frequently vague. Some labels were probably not prepared until long after a bird was collected, perhaps even after the collector returned to the East at the end of an expedition. Then he may have had to rely on his memory to supply some of the label data.

After 1850 nearly every account of a government expedition included a scientific appendix based on observations and collections made by expedition members. If the collector himself did not publish an account of his work, some member of the eastern

scientific community usually did so. Baird, a protege of Audubon, often wrote the ornithological reports.

William S. Wood with Bryan Wagon-road Expedition: 1856, 1857

Bryan (1857)

Southeastern Wyoming

When it became obvious that differences between northern and southern factions in Congress would delay construction of a trans-continental railroad, Congress appropriated money for the surveying and improvement of several western wagon roads. In 1856 Lieutenant Francis T. Bryan of the Army Corps of Topographical Engineers was ordered to survey a wagon road from Fort Riley, Kansas, to Bridger's Pass in southcentral Wyoming. The survey crew hired by Bryan included William S. Wood, an experienced rod carrier, who also agreed to make natural history collections during the trip. Bryan's party left Fort Riley in June 1856 and traveled northwest along the Republican Fork to Fort Kearny on the Platte River. From there they continued up the valleys of the Platte and South Platte rivers to the mouth of Lodgepole Creek in northeast Colorado. They ascended the creek and entered the southeast corner of Wyoming near Pine Bluffs about July 28. The survey party continued up Lodgepole Creek to its source in the Sherman Hills, then crossed the hills and descended to the Laramie Plains. Here they struck an emigrant trail which they followed along the eastern flank of the Snowy Range to the head of Pass Creek. They followed Pass Creek between the main range of mountains and Elk Mountain and continued west to Emigrant Crossing on the North

Platte River (north of present town of Saratoga). After fording the river, they apparently traveled up Sage Creek toward the Continental Divide. None of the men had ever seen Bridger's Pass, and Bryan was unable to positively locate it, even with Stansbury's directions. They apparently crossed the divide south of the actual pass near the head of Sage Creek. Bryan descended to Muddy Creek and followed it a short distance to make sure the waters flowed west, then turned back. Their return route was a few miles north of the outward trail until they neared Elk Mountain. They went around the north end of the mountain through Rattlesnake Pass. Back on the Laramie Plains they rejoined their old trail and followed it south across the Laramie River. About September 1 they crossed the hills at the south end of the Laramie Basin and descended to the Cache la Poudre River in Colorado.

In the spring of 1857 Bryan organized a party of retrace the route and improve the road (Abert 1857). Wood again accompanied the expedition and served as naturalist and collector (Baird 1858). Wood's collection dates (Baird, et al. 1858) indicate that Bryan's party was in Wyoming at least from mid-July to mid-August.

Although Wood was undoubtedly kept busy with his official duties as a rod carrier, he did collect birds whenever possible. During his two summers in Wyoming he collected about 80 specimens representing 44 species. He sent his collections to Spencer Baird at the Smithsonian Institution (Baird 1857b, 1858), and information on the specimens was included in the Pacific Railroad Report (Baird, et al. 1858). Wood's collection from Wyoming included a

Short-billed Dowitcher, a Chestnut-collared Longspur and two immature Zonotrichia which Baird called White-throated Sparrows. Many of the common species of the plains and foothills of southeastern Wyoming were represented by at least one specimen.

Ferdinand V. Hayden with Warren: 1857

Warren (1858)

Eastern Wyoming

In 1857 Lieutenant Gouverneur K. Warren, Corps of Topographical Engineers, received orders from the Secretary of War to locate a route from the Fort Snelling-Big Sioux Road of Minnesota to Fort Laramie and South Pass via the Loup Fork of the Platte River. He was also to explore the Loup Fork and Niobrara rivers and in the time remaining examine the Black Hills. Dr. Ferdinand V. Hayden, already a veteran Western explorer, was a member of Warren's party. He performed the triple duties of surgeon, geologist and scientific collector.

Warren's expedition left Sioux City, Iowa, on July 6, 1857, and traveled southwest to the Loup Fork in eastern Nebraska. They followed the river to its source in the sand hills, then turned north toward the Niobrara River. From the Niobrara they traveled west and south to Fort Laramie. At Fort Laramie, Warren spent some time refitting the expedition.

Hayden took advantage of the layover to make an excursion to Laramie Peak on August 24 and 25. Describing his first visit to the peak, he later wrote (Hayden 1863), ". . . I have never known a region which seemed to promise so many novelties to the

ornithologist." During his two-day visit he collected 35 birds representing 15 species (Hayden 1863). The excursion to Laramie Peak provided Hayden with a small, personal triumph, for he collected a Three-toed Woodpecker that Spencer F. Baird (Baird, et al. 1858) described as a new species, Picoides dorsalis. This woodpecker is now recognized as the Rocky Mountain race, Picoides tridactylus dorsalis, of the Northern Three-toed Woodpecker. He also collected what was then called a Brown-headed Woodpecker and noted that his specimen was only the third one ever received by the Smithsonian Institution. The Brown-headed Woodpecker, once considered a distinct species by ornithologists, is actually the female Williamson's Sapsucker. Hayden also saw great numbers of Lewis' Woodpeckers on the peak. He collected two White-winged Crossbills and noted that they were abundant in the Laramie Range that summer.

Warren decided to divide his party to accomplish all of the objectives of the expedition in one season. Warren, with Hayden and about 20 other men, organized a pack train to explore the Black Hills. The rest of the expedition members set out to explore the Niobrara River. Warren's party left Fort Laramie about September 4 and headed north past Rawhide Butte, along Old Woman Creek and across the South Fork of the Cheyenne River. They followed a branch of Beaver Creek into the Black Hills. Near Inyan Kara Mountain they met a large force of Dakota Sioux who barred further passage. The party turned back and retraced their route 40 miles, before turning east near the North Fork of the Cheyenne River. They left the state about September 30.

In addition to the collection from Laramie Peak, Hayden also collected birds along the route to the Black Hills. He collected a total of 94 specimens representing about 30 species during the time he was in Wyoming (Baird et al. 1858). All of these specimens were sent to the Smithsonian Institution (Baird 1858). Information on his Wyoming collection, including collection dates and locations, is included in the report on the ornithology of the Pacific Railroad Surveys (Baird et al. 1858). Hayden (1858) also published a list of all the birds he had observed or collected during his years in the West, but he did not mention specific collection sites, giving only a general statement of the range of each species. The best information on this collection is in a paper written by Hayden (1863) on the birds of the upper Missouri region. In this paper he mentions many specific collection sites and gives information on the distribution and abundance of nearly every species.

James G. Cooper and C. Drexler with Magraw Wagon-road Expedition:

1858-1858

Fort Laramie and Fort Bridger Areas

Before 1856 federal road building in the West was the responsibility of the War Department. Most wagon roads were constructed ostensibly for military purposes. By the early 1850's a growing and vocal California population was demanding better roads between the East and the Pacific. In 1856 Congress recognized this need for non-military wagon roads and assigned a public road building project to the Department of the Interior under what was eventually



called the Pacific Wagon Road Office (Campbell 1859). The actual surveys and road improvements were to be made by civilians hired by the government.

In 1857 Congress appropriated money for the improvement of the central overland route from Fort Kearny, Nebraska, to Honey Lake, California, via South Pass. William Magraw was hired to supervise work on the eastern division of the road as far west as City Rocks, Utah. Magraw hired Dr. James G. Cooper as surgeon and naturalist of the expedition and C. Drexler as the hospital steward and taxidermist (Baird 1859). Despite the fact that field work in the West was feasible only during the summer. Magraw dawdled in Independence, Missouri, supposedly outfitting the expedition, until early July (Campbell 1859). The party did not reach Fort Laramie until late August.

At Fort Laramie Cooper and several other members of the party quarreled with Magraw and resigned from the expedition. Cooper remained at the fort at least until late September (according to his collecting dates in Baird et al. (1859)). He collected about 20 species of birds around the fort. He also saw an Eastern Bluebird near the fort but did not collect it (Cooper 1870). Drexler collected a few birds near the fort, including a Cassin's Kingbird and a Lapland Longspur (Baird et al. 1858).

From Fort Laramie the remainder of the men, including Drexler, continued with Magraw to the upper Sweetwater River. Because of the approaching winter, Magraw decided to go no farther that year. The party selected a sheltered site for a winter camp on the Little Popo Agie River north of the Oregon Trail. Here the expedition

disbanded. Magraw and a large number of men, without informing anyone in the Pacific Wagon Road Office of their intentions, took most of the mules, wagons and supplies and enlisted in the army at Fort Bridger (Campbell 1859). A small force of men, including Drexler, stayed at the winter camp to guard the remaining supplies. While there, Drexler wrote of seeing "millions" of Bohemian Waxwings (Baird et al. 1858). "Every tree for miles was filled with them, the flock rivaling that of the wild pigeon in its size."

Drexler went to Fort Bridger in March and remained there until June. He collected more than 100 species of birds around the fort, including the Broad-tailed Hummingbird, Gray Flycatcher, Mockingbird, Sage Sparrow, Green-Tailed Towhee, and a single specimen each of the Northern Waterthrush and White-faced Ibis (Baird et al. 1858). Two new subspecies were described from his collection: a Hermit Thrush, Hylocichla guttata auduboni, (Baird 1864) and a Yellow Warbler, Dendroica petechia morcomi, (Coale 1887).

Drexler sent his Wyoming collection to Spencer Baird at the Smithsonian Institution. Baird included a list of the species collected by Drexler in an appendix to the report on the ornithology of the Pacific Railroad Surveys (Baird et al. 1858). This list is especially valuable because Drexler supplied information on the abundance of many species, something many of his contemporaries did not do.

Charles McCarthy with Simpson: 1858, 1859

Simpson (1876)

Along Oregon Trail



After the short skirmish with the Mormons in 1857, the federal government began a program of explorations and surveys centered around the Mormon colonies in the Utah Territory. In 1858 Captain James H. Simpson, Corps of Topographical Engineers, was ordered to proceed west over the Oregon Trail to Fort Bridger and open up a new wagon road between the Fort and Camp Floyd in the Carson Valley of Utah (Baird 1860). Simpson's party, including Charles McCarthy as taxidermist, left Fort Leavenworth, Kansas Territory, in May and reached Fort Bridger in September. They spent the fall of 1858 surveying the route between the Fort and Camp Floyd, then joined the United States Army of Utah in winter quarters at Camp Floyd.

In January 1859, Captain Simpson wrote to the Secretary of War suggesting that a direct route from Camp Floyd to Genoa, Utah, should be surveyed to shorten the distance between Salt Lake and California. The project was approved, and Simpson began assembling the necessary men and equipment. Charles McCarthy again served as taxidermist. His official orders from Captain Simpson read:

"To Mr. Charles McCarthy is assigned the duty of taxidermist and collector of specimens illustrative of the animal and insect world. In order to (do) this, he will be assiduous in the collection of the necessary proportion of specimens, and in their being properly prepared for preservation and transportation."

From May to August, Simpson's party surveyed possible wagon routes between Camp Floyd and Genoa. When Simpson returned to Camp Floyd in August, he found that his orders had been modified. He was to survey a route through the Timpanogos and Uinta Mountains to the valley of the Green River, then proceed back to Fort

Leavenworth via the Oregon Trail.

Simpson's final report does not contain any details of the return trip across Wyoming except to mention that they left Fort Bridger on August 29 and arrived at Fort Laramie on September 17.

McCarthy collected more than 100 species of birds in the West, including about 30 species along the Oregon Trail in Wyoming (Baird 1876). He sent the collection of birds and eggs to Spencer Baird at the Smithsonian Institution, and Baird prepared an annotated list of the species which was appended to Simpson's official report (Baird 1876). Publication of the entire report was delayed until 1876 because of the Civil War. Unfortunately, Baird did not include collecting dates in his report, and it is impossible to determine which species were collected during the outbound trip in 1858 and which during the return journey in 1859. Among the species of birds from Wyoming were a Common Tern from the Sweetwater River and a Purple Martin collected 27 miles west of Fort Laramie. Forty miles west of Fort Laramie, McCarthy collected the only Passenger Pigeon ever recorded in the state.

George Suckley: 1859

Beidleman (1956)

Along Oregon Trail

In 1859 Dr. George Suckley, a surgeon in the Army Medical Corps, accompanied a party of army recruits to the Utah Territory. Suckley had once served as a naturalist in the West with the Pacific Railroad Surveys.

The party of recruits left Fort Leavenworth, Kansas, about

June 11. They followed the Oregon Trail as far as Fort Laramie, which they reached in late July. From the fort they took the southwest cutoff along the Laramie River and Chugwater Creek, then crossed Cheyenne Pass to the Laramie Plains. They apparently followed the Overland Trail west through Bridger's Pass. By August 12, the date of the last entry in Suckley's journal, they were on Muddy Creek in southwest Carbon County.

Suckley's journal contains many references to the birds he saw along the trail. On July 29 he killed a Black-billed Cuckoo on Chugwater Creek, but the skin was too badly damaged to preserve. He also saw a small owl retreating into a burrow, but he was unable to identify the bird, although he felt it was not a Burrowing Owl (possibly a Short-eared Owl). He did collect a Burrowing Owl near the head of Lodgepole Creek. On July 31 the party first saw Magpies. They did not see any Sage Grouse until they reached the Medicine Bow River near Elk Mountain. By the time they reached Muddy Creek, Suckley had seen many of these grouse, and he described the appearance of the cocks, the calls of the chicks, and the cackling of the hens. At the end of his journal he listed the birds he had collected between Fort Leavenworth and Salt Lake. Suckley collected about a dozen species in Wyoming. He apparently sent his collection to the Smithsonian Institution. The list of donations to the museum in 1860 (Baird 1861) acknowledges receipt from a Dr. Suckley of "Birds, eggs, mammals, and alcoholic specimens from Fort Kearny and Fort Laramie."

Ferdinand V. Hayden, M. C. Hines and George H. Took with the

Raynolds Expedition: 1859-1860

Raynolds (1868)

Northern two-thirds of Wyoming

The so-called Yellowstone Expedition, led by Captain William F. Raynolds in 1859-1860, was the last major exploring expedition in the West conducted by the Corps of Topographical Engineers. When Lieutenant G. K. Warren reported the results of his exploration in the Dakota country to Congress (Warren 1858), he recommended that an expedition be sent to explore beyond the Big Horn Mountains and in the upper Yellowstone country. Congress appropriated \$60,000 for the proposed exploration, and an expedition led by Captain Raynolds began the reconnaissance in the summer of 1859.

The money appropriated by Congress was to pay the salaries, transportation and subsistence of civilian members of the expedition, plus the cost of any supplies which the enlisted men of the expedition could not obtain from commissary stores at western army posts. Raynolds was authorized to employ eight assistants, including naturalists, at a salary not to exceed \$125 per month. His staff included Dr. Ferdinand V. Hayden, naturalist and surgeon, and Dr. M. C. Hines, assistant surgeon and naturalist. George H. Took, a civilian assigned to the expedition by the Secretary of War, also served as a naturalist.

The expedition members assembled at St. Louis, Missouri, and steamed upriver to Fort Pierre, South Dakota. They spent 10 days at Fort Pierre outfitting the expedition and bargaining with the

Dakota Sioux for permission to cross their lands. On June 28 the small party of scientist-explorers, with an escort of 30 infantrymen, marched westward from the fort toward the Cheyenne River. They traveled north and west across the Cheyenne drainage and entered the northeast corner of Wyoming on July 14 near the Brakes of the Black Hills. They traveled north to the Belle Fourche River and followed that stream west to its great southward bend. Reynolds continued west across the Little Missouri River to the Little Powder River and followed the latter stream north out of the state on July 25. The expedition continued north to Fort Sarpy on the Yellowstone River where Reynolds replenished the supplies.

On August 31 they left Fort Sarpy and headed south up the valley of the Big Horn River. On September 2, Captain Reynolds divided the party. Lieutenant Maynadier, the second in command, led a party that included Hines and Trook to explore the Powder River drainage. Reynolds, with the remaining men, continued south along the east flank of the Big Horn Mountains. The two parties reunited October 12 near Red Buttes on the North Platte River.

Reynolds established a winter camp for the entire expedition on Deer Creek (southwest Converse County) a few miles from the North Platte River. During the winter Hayden, Trook and Hines collected many of the common birds around camp, including large numbers of Sage Grouse, Blue Grouse and Gray-crowned Rosy Finches (Coues 1874). From October 19 to November 4 a party of eight men, including Hayden, explored the region between the Platte and the headwaters of the Cheyenne River. Another small party, again in-

cluding Hayden, explored the region between the Platte and the upper Powder River from March 29 to April 7, 1860.

The entire expedition left winter quarters on May 10. They were again divided into two parties as during the previous fall. Captain Reynolds headed west toward the Wind River, while Lieutenant Maynadier led his contingent along the Oregon Trail. The Maynadier party followed the trail along the Sweetwater River until a gap in the hills permitted them to turn north toward the Popo Agie River. At the mouth of the Popo Agie they reunited briefly with Captain Reynolds' party.

From the mouth of the Popo Agie, Reynolds continued west up the Wind River. He had hoped to cross the mountains into the valley of the upper Yellowstone River, but huge snowdrifts blocked the way. Instead, he was forced to ascend the Wind River and cross the Continental Divide onto the head of the Gros Ventre River at Union Pass. Shortly after crossing the divide Reynolds noted:

"The animal life of this region differs essentially from that on the Atlantic slope. Even in Wind River valley many birds new to us were seen, and Dr. Hayden and his assistants have been very busy collecting specimens of all kinds. Three or four squirrels previously unknown to us, double that number of birds, and a large and new species of rabbit have been obtained."

Although the Continental Divide is not a dividing line for the North American avifauna, Hayden had collected several distinctly western birds near the divide, including a pair of Harlequin Ducks, Lewis' Woodpecker, Violet-green Swallow, Clark's Nutcracker, Western Tanager, Cassin's Finch and Green-tailed Towhee (Coues 1874).

From Union Pass, Reynolds' party followed the Gros Ventre



River to its confluence with the Snake River in Jackson Hole. They left the state on June 18 via Teton Pass and proceeded north to a rendezvous with Lieutenant Maynadier's party at the Three Forks of the Missouri in Montana.

From the mouth of the Popo Agie River, Lieutenant Maynadier followed the Big Horn River north. On June 5 they left the valley of the Big Horn near the mouth of the Greybull River and proceeded northwest across the Shoshone River toward Clark's Fork of the Yellowstone. They followed Clark's Fork out of the state on June 12.

The intervention of the Civil War in 1860 delayed publication of the official report of Reynolds' expedition until 1868. Dr. Elliot Coues prepared a report on the birds collected by Hayden, Trook, and Hines, but it was never published (Coues 1874). This manuscript later was the basis of Coues' book on the birds of the Missouri River drainage published in 1874. Together Hayden, Trook and Hines collected approximately 250 bird skins representing about 80 species (Coues 1874). This was the largest and most extensive collection of birds brought back from Wyoming up to that time. The only part of the country they traversed that is not represented by collections is the Black Hills region. The greatest number of birds were collected around the winter camp on Deer Creek. Hayden also collected many birds along the Wind and Gros Ventre rivers, including two White-winged Crossbills. Trook collected along the Powder, Popo Agie and Big Horn rivers. Hines apparently collected only around the winter camp.

1870-1875

## Scientific Expeditions

James Stevenson, Henry D. Schmidt and Campbell P. Carrington with  
Hayden, U.S. Geological Survey of Territories: 1870

Hayden (1871)

Southern Wyoming

After the Civil War, Ferdinand V. Hayden was once again in the West, this time leading his own survey. In 1867 he was hired to conduct a geological survey of the new state of Nebraska (Hayden 1873a). The following year he extended his surveys west to the Rocky Mountains, generally following the line of the Union Pacific Railroad from Cheyenne to Fort Bridger. He continued his work in 1869, exploring from Cheyenne southward along the eastern face of the Colorado Rockies into northern New Mexico. That year his survey was officially named the United States Geological Survey of the Territories under the Department of the Interior. The collections which Hayden sent to the Smithsonian Institution during the first 3 years of the survey were primarily fossils. There is no indication that birds were collected.

Hayden's expedition of 1870 was the largest and best equipped yet. The party of 20 men included James Stevenson, managing director and zoological collector, Campbell P. Carrington, zoologist, and Henry D. Schmidt (or Smith), a naturalist. Hayden was not able to begin actual field work until August because the appropriation bill for the 1870 survey was not signed by the President until July 15. Immediately thereafter the party took the train to



Cheyenne. The railroads frequently provided free transportation or reduced fares for members of scientific expeditions.

At Fort D. A. Russell near Cheyenne Hayden outfitted the expedition. On August 7 the party headed north along the eastern base of the Laramie Range. By the 14th they had reached the Oregon Trail near La Bonte Creek. They followed the emigrant road across the state to Fort Bridger. Near the fort they set up a semi-permanent camp and spent about 20 days exploring the northern slope of the Uinta Mountains. From the fort they headed south to Henry's Fork, explored that stream to its source, then followed the Green River to Brown's Hole, Colorado, before turning back. They followed the Green River back to Green River Station, then turned east and followed the old Overland Stage Road up Bitter Creek, through Bridger's Pass, across Sage and Pass Creek basins to the Laramie Plains. They continued south to the Big Laramie River, then turned east and crossed the Sherman Hills at Cheyenne Pass. They reached Cheyenne November 1.

The report on the zoological collections made by the three naturalists was written by James Stevenson (1871). Stevenson listed 124 species of birds and commented that the collection included no new species. However, the supposed immature specimen of a Gray-crowned Rosy Finch collected in the Uinta Mountains of Utah was later recognized as a new species by Robert Ridgway (1875), and named Leucosticte atrata, the Black Rosy Finch. Because of the late start, they did not collect any nests or eggs, but their collection included several uncommon birds. On Cottonwood Creek (Platte

County) they collected two Purple Martins. A little further west they collected a White-winged Crossbill. In the southwest corner of the state they collected Bushtits, Sage Sparrows, a Hooded Merganser and a Stilt Sandpiper. Their collection from the state also included 12 Common Redpolls, 3 Golden Plovers, 3 Baird's Sandpipers and a Bufflehead.

C. Hart Merriam, Walter B. Platt and Thomas W. Jaycox with Hayden,

U.S. Geological Survey of Territories: 1872

Hayden (1873b)

Western edge of Wyoming, Yellowstone Park

In 1871 Hayden spent about 6 weeks exploring the Yellowstone area, but apparently no member of his party collected birds. His final report for that year (Hayden 1872) is mostly a description of the thermal and geological wonders of the area.

Hayden returned to the Yellowstone country in 1872. The large appropriation granted to the Geological Survey that year enabled him to outfit two field parties of about 30 men each. Hayden led one party south from Fort Ellis, Montana, into the Yellowstone country to explore areas he had missed the previous summer. Walter B. Platt was the naturalist with Hayden's party.

The second party, led by Hayden's executive assistant James Stevenson, assembled at Ogden, Utah. C. Hart Merriam, then only 16 years old, and Thomas W. Jaycox served as the zoologists with Stevenson's party. The second party headed north out of Ogden toward Fort Hall, Idaho. At Fort Hall they exchanged their wagons for pack animals, then proceeded up the west side of the Snake

River into the Teton Basin of Idaho. On July 23, Stevenson established a semi-permanent base camp at the mouth of Teton Creek, and the scientists began to explore the basin and the nearby Teton Mountains.

Twelve members of the party planned an assault on the highest peak in the Teton Range. They set up a small camp in Teton Canyon, Wyoming, and on July 29 attempted to climb the peak. Some of the men claimed to have reached the summit, but there is no evidence that they actually succeeded. The climbing party remained in the mountains as long as possible, attracted by the scenery and abundant wildlife. Nathaniel Langford, one of the climbers, wrote: "The thickets along the streams, and especially the groves near the upper line of the timber, are full of two or three varieties of grouse . . ." Finally they returned to the main camp on August 2.

From Teton Basin, Stevenson's party traveled northwest to the source of Henry's Fork in Henry's Lake. They crossed the Continental Divide at Targhee Pass onto the drainage of the Madison River and followed the river into the Yellowstone Park country. On August 14 they rendezvoused with Hayden's party on the Firehole River.

Hayden soon left the Yellowstone country and headed north toward the Three Forks of the Missouri in Montana. Stevenson's party remained in the Upper Geyser Basin until September 3. From there, they headed south to explore the area around Shoshone Lake and the headwaters of the Snake River. On September 6 there was about an inch of snow on the ground, and Merriam (1873) noted

". . . a flock of about thirty robins . . . (which) seemed to be moving southward." The party followed the Snake River into Jackson Hole. On the river near Jackson Lake, Merriam (1873) collected two Trumpeter Swans. They continued south along the river. The main party left the state via Teton Pass, while a few of the men continued south through the Snake River Canyon into Idaho.

Merriam (1873) wrote the report on the mammals and birds collected by himself, Platt and Jaycox. In Wyoming they collected 93 bird skins, representing 39 species. These were primarily from Teton Canyon and Yellowstone Park. This was the first significant collection of birds from the park area. In the Lower Geyser Basin of Yellowstone, Merriam collected both a Black-backed and a Northern Three-toed Woodpecker and one of a flock of 30 Baird's Sandpipers. Although Merriam collected many nests with eggs in the Ogden area, he did not reach Wyoming until after the nesting season and was able to collect only two nests in the state. In addition to the annotated list of specimens collected in Utah, Idaho and Wyoming, Merriam also included a list of 28 species of birds found in Teton Basin and Teton Canyon in July and a list of 33 species occurring in the Firehole Basin in August.

Merriam also stopped at Cheyenne on his way to Ogden and collected a few birds, including a Cassin's Kingbird.

George B. Grinnell with the Custer Expedition to the Black Hills:

1874

Ludlow (1875)

Northeast Wyoming

As late as 1874 the Black Hills of South Dakota and Wyoming were essentially unexplored. Warren (1858) in 1857 and Reynolds (1868) in 1859 had visited the edges of the hills and described such prominent landmarks as Inyan Kara Mountain and the Missouri Buttes, but the interior of the region was unknown. In 1862 the legislature of Dakota Territory first petitioned Congress to cede the hills to the territory (Lamar 1956). During the next decade rumors of fabulous gold deposits in the hills greatly increased public interest in the region. Finally on January 24, 1873, the Legislative Assembly of Dakota presented a petition to Congress (Anon. 1873) requesting a scientific-military reconnaissance of the Black Hills. Such an expedition would violate the treaty of 1868 which reserved the hills for the Sioux Indians (Kappler 1972); nevertheless, Congress authorized an expedition to the hills in the summer of 1874.

The expedition was organized at Fort Abraham Lincoln, North Dakota, under the command of Lieutenant Colonel George Custer. Because of anticipated trouble with the Indians, the command was very large, consisting of nearly 1,000 men. More than 100 wagons were needed to carry the supplies. It was probably the largest and best equipped expedition ever to cross the Western Plains. Captain William Ludlow, Army Corps of Engineers, was assigned to the expedition as the Engineer Officer and he wrote the official account of the expedition. Also, accompanying the expedition was George Grinnell, a representative of the Yale University paleontologist, Othaniel C. Marsh. Grinnell was assisted by his friend

and famous frontier scout, Captain Luther North. When Grinnell joined the expedition at Fort Lincoln, Captain Ludlow asked him to also serve as the zoologist of the expedition.

The expedition left Fort Lincoln on July 2. By July 17 they had traveled west and south across the Dakotas to what is now the southeast corner of Montana. The Wyoming part of the expedition began late on July 17 or the morning of the 18th. On the 18th they traveled southwest to a camp on the north bank of the Belle Fourche River. The morning of July 20 marked what Ludlow considered to be their actual entrance into the hills. He was struck by the contrast between the hot, dry barren land north of the river and the water and lush vegetation of the hills. Their camp on the evening of the 20th was apparently on Hay Creek, about 3 or 4 miles west of the present town of Aladdin. On July 21 they skirted the eastern edge of the Bear Lodge Mountains and camped on a small branch of Red Water Creek. They continued south and camped just east of Inyan Kara Mountain from July 22 to 24. Some of the men climbed the peak to survey the surrounding country, but the view was obscured by smoke from a prairie fire. On July 24 the expedition turned east and that night camped in the valley of Cold Springs Creek. The next day they continued east and set up camp just west of the present Wyoming-South Dakota line in Floral Valley. On the morning of the 26th the Wyoming part of the trip ended. After leaving Wyoming, they explored the southern end of the hills, then turned north and east. They followed the Heart River back to Fort Lincoln and arrived at the fort on August 30, just 60 days after departure.



At Ludlow's request, Grinnell wrote a report on the zoology of the expedition (Grinnell 1874, 1875). Although he devoted most of his time to collecting fossils (Grinnell 1874), he did collect some birds and mammals. The expedition traveled so rapidly, however, that he was able to collect and take notes on only the more common species. He listed about 110 species of birds in his report and included information on the habits and abundance of some of these. During the nine days he was in the Wyoming part of the Black Hills, he collected or observed about 30 species. His Wyoming collection included the distinctive white-winged race of the Dark-eyed Junco. He noted that Sharp-tailed Grouse were common in the open valleys and on the sparsely wooded hillsides, while Ruffed Grouse were abundant in the pine forests of the hills. He saw only a single Blue Grouse. Sandhill Cranes had nested in the hills that summer, and the young were two-thirds grown by July. Lark Buntings were common, and Grinnell gave a detailed description of their breeding habits.

George Bird Grinnell with Ludlow in Yellowstone National Park: 1875

Ludlow (1876)

In 1875 Captain William Ludlow was again in the West, this time to make a reconnaissance from Carroll, Montana, on the Missouri River to Yellowstone National Park. As during the previous summer (Ludlow 1875), Grinnell accompanied Ludlow as a representative of Professor Marsh, the Yale paleontologist. Grinnell traveled at his own expense and was not paid for his work. The members of the expedition traveled by steamboat up

the Missouri River to Carroll. The entire party was not assembled there until July 27. From Carroll, Ludlow led the expedition southwest across central Montana to Fort Ellis (near Bozeman). They left Fort Ellis on August 11 and followed the trail up the Yellowstone River toward the park.

On August 13 they entered Yellowstone National Park. That night they camped at Mammoth Hot Springs. After a one-day layover at Mammoth, they started up the Gardiner River. They took the trail along Lava Creek past the falls, then headed west toward the confluence of the Yellowstone and Lamar rivers. From their camp near the junction of the two rivers, they traveled south. At first they followed the Yellowstone River, but the rough terrain along the river forced them to swing west and cross the shoulder of Mount Washburn. From Mount Washburn they descended to a camp on Cascade Creek about a mile from the Lower Falls of the Yellowstone. They continued south along the river to Yellowstone Lake, then turned west and traveled to the Upper and Lower geyser basins. After a brief inspection of the geyser basins, they turned back and retraced their route to Mammoth. They left the park on August 27.

Rain or snow fell nearly every day they were in the park, yet Grinnell managed to observe or collect 139 species of birds during his two-week visit (Grinnell 1876). Osprey were "nowhere so abundant as on the Yellowstone River." and while following that stream, Grinnell saw "from six to twelve of those birds every day." On the Yellowstone River near its exit from Yellowstone Lake he saw a small flock of Snow Geese. White Pelicans were



very abundant on the lake. A few Lesser Yellowlegs ran along the lake shore. In the Lower Geyser Basin he encountered flocks of 50 to 60 Biard's Sandpipers. The party saw many Blue Grouse hens with their chicks in the creek bottoms, but adult males were very scarce. Grinnell (1876) thought the males summered near timberline.

#### 1850-1880

##### Additional Collections and Observations

During the period of active government exploration in the West, a few army surgeons who were not attached to major expeditions also collected birds in Wyoming. In the 1850's William A. Hammond collected in eastern Wyoming (Hume 1942). His specimens were probably sent to the Smithsonian Institution. Dr. R. B. Hitz made a large collection of birds and eggs, principally around Fort Laramie and on Laramie Peak, in 1864 and 1865. He sent these specimens to the Smithsonian Institution (Baird 1872a & b).

In 1868 Major Richard I. Dodge was stationed at Fort Fred Steele on the North Platte River (central Carbon County). Dodge was an avid hunter, and he described a Sage Grouse hunt on Muddy Creek. He wrote (Dodge 1959):

" . . . between breakfast and dinner (we) bagged so many grouse that, although we mustered, including hunters and escort, some thirty persons, and all ate what they wanted, we yet carried into the post nearly 200 birds, of a weight of almost 1,000 pounds.

Fort Fred Steele is a sort of centre of the very best hunting ground for this grouse that I know of."

He noted that Audubon had named the Sage Grouse "Cock of the Plains," but Westerners avoided this stilted name and commonly called the birds "sage hens."

Dodge also wrote that many Canada Geese nested along the river near the fort, ". . . some of them high up in the lofty cottonwoods quite forty feet above the ground."

After the transcontinental railroad was completed in 1869, Wyoming became much more accessible to scientific collectors. In 1870 Othaniel C. Marsh, professor of paleontology at Yale University, led an expedition into the West to collect fossils. George Bird Grinnell, a recent graduate of Yale, was one of the lucky ones selected to accompany Marsh. The plan of the Marsh expedition was to ride the railroad, taking extended side trips north and south of the line. The members of the expedition did not spend all of their time collecting fossils, as is shown by Grinnell's (1873) account of a Sage Grouse hunt in the foothills of the Uinta Mountains of Wyoming. Early one October morning, Grinnell and three companions set out from camp to spend a day bird-hunting along the small streams issuing from the foothills. The party split up, two men going south, while Grinnell and his companion headed north. After a two-mile walk, Grinnell and his partner reached the foothills. The small streams still had a little water in them, and the occasional deep pools were frequented by "mallards and black ducks." Grinnell's companion flushed a pack of Ruffed Grouse near the stream. Soon they began to encounter small flocks of Sage Grouse. Grinnell also noted the presence of Common Flickers, Clark's Nutcrackers and Sandhill Cranes.

When the four hunters reunited at the end of the day, they had bagged a total of 54 Sage Grouse, 4 Ruffed Grouse, 16 Mallards and Black Ducks, 5 Blue-winged Teal, and a single Snow Goose which Grinnell had flushed from a stream.

An H. R. Durkee was also in Wyoming about 1870. He donated birds, eggs and nests, and osteological specimens from Wyoming Territory to the Smithsonian Institution (Henry 1871).

In 1871 the Museum of Comparative Zoology of Harvard University send an expedition to the Rocky Mountains to collect specimens of vertebrate animals. The scientists collected approximately 1500 bird specimens, representing 200 species, in Kansas, Colorado, Wyoming and Utah (Allen 1871). In the report on the ornithology of the expedition, Allen (1871) included a list of 41 species seen at Cheyenne and commented on the abundance and variety of Tyrannidae (fly-catchers) along the willow-bordered streams in the area. The summary list of birds collected by the expedition includes additional records for the southern part of the state.

Prominent among the early articles on Wyoming birds is a paper by C. H. Holden, Jr. and C. E. Aiken (1872) on the birds of Wyoming and Colorado. This paper has been the source of much confusion. Coues (1874) and Knight (1902) credited the collections of both Holden and Aiken to Wyoming. Actually, only Holden collected in Wyoming. All of Aiken's records are from Fountain, Colorado (Coues 1873, Cooke 1906). Holden collected or observed 142 species and varieties around Sherman (between Cheyenne and Laramie) in the summer of 1871. The specimens he identified as Rusty Blackbirds

were actually Brewer's Blackbirds (Cooke 1906). Holden's specimens were sent to the Chicago Academy of Science, which was later destroyed by fire (Henderson 1925).

In the summer of 1876, Captain William Carpenter visited the Big Horn Mountain region and wrote a short account of the natural history of the area (Carpenter 1876). He noted that Richardson's form of the Blue Grouse was abundant in the pine forests of the higher slopes, but the Dusky form was rare. Sharp-tailed Grouse were common along the streams in the foothills, and Sage Grouse occurred on the lower slopes and adjacent plains wherever sagebrush (Artemisia spp.) was common. Although he searched carefully in the high alpine meadows, he did not find any White-tailed Ptarmigan. Water Pipits and a species of Leucosticte (rosy finch), which he had found occurring with the ptarmigan in Colorado, were present but quite rare. Waterfowl and wading birds were extremely rare in the mountains. Even on the adjacent plains he saw only an occasional Killdeer or Upland Sandpiper, but Long-billed Curlew were a fairly common breeding bird in the area.

In 1877 A. G. Brackett published an annotated list of birds occurring around Laramie (Brackett 1877a,b). All of the reported species were fairly common except a White Pelican and a Short-billed Dowitcher, both collected at Hutton Lake.

S. W. Williston spent the spring and early summer of 1878 at the small coal-mining town of Como in western Albany County. He sent his observations on the birds of the area to George Grinnell, editor of the conservation magazine Forest and Stream (Williston

1879a,b,c&d). Grinnell had spent a few days near Como in September 1878, and he added his observations to those of Williston. Together they listed over 100 species of birds collected or observed in the area.

Frank Bond in Wyoming: 1882-1905

Frank Bond arrived in Cheyenne, Wyoming Territory, in 1882 (Bond 1901). During his years in the state he worked as a surveyor and newspaper publisher and held several public offices, including representative to the first state legislature. Bond had always been deeply interested in birds. During his college days at the University of Iowa, he and his twin brother Fred made a collection of 500 bird specimens which they presented to the university (Palmer 1944).

By 1885 Bond was already considered an authority on the birds of the state (Warren 1885). He had collected and mounted a large number of birds for his private museum. His first publication on Wyoming birds was a list of 199 species known to occur in the territory. This was included in the annual report of the territorial governor to the Secretary of the Interior (Bond 1885). The list included several species now considered rare or unusual in the state: Short-billed Marsh Wren, Sprague's Pipit, Northern Parula Warbler, Nashville Warbler, Blackburnian Warbler, White-necked Raven, Black Swift, Black-necked Stilt, Green Heron, White-fronted Goose, Whooping Crane, Wood Duck and Common Tern.

Bond (1900) was one of the first to describe the courtship of the Sage Grouse. Although many of his observations were correct,

he mistakenly attributed the "worn" appearance of the breast feathers of the cocks to abrasion. He described and illustrated the supposed manner in which the cocks slid along the ground on the inflated air sacs, thus supposedly wearing away the feathers. Actually, the short stiff breast feathers of the cocks are modified contour feathers.

In all, Bond contributed about a dozen short articles to the Auk on Wyoming birds. He also gave much information and assistance to Wilbur Knight, author of the first book on Wyoming birds (Knight 1902). Bond possessed considerable artistic ability, and he provided illustrations for Knight's book.

As President of the Wyoming Audubon Society, Bond worked to eliminate the spring waterfowl hunt and actively opposed the listing of the Mourning Dove as a game bird (Bond 1904).

After Bond left Wyoming (about 1905), he served with various government agencies in Washington, D.C. In 1907 he was appointed Chief Clerk of the General Land Office in the Department of the Interior. He prepared many of the early Executive Orders creating Federal Bird Reservations and conceived the idea of establishing refuges on a number of reclamation projects in the West (Palmer 1944).

Wilber C. Knight writes first book on Wyoming birds: 1902

Knight (1902)

Entire State

In 1894 Wilber C. Knight, a prominent Wyoming geologist, was appointed Curator of the University of Wyoming Museum in Laramie

(Bond 1903). As curator of the museum, he received many questions about the birds of the state which he could not answer. Knight felt responsible for providing this information. Even though he had only a secondary interest in ornithology, he decided to write a book on the birds of the state (Bond 1903).

Knight and Charles W. Gilmore, one of his students, began to collect birds in Albany and Carbon Counties whenever they had the opportunity. Dr. Mortimer Jesurun collected birds around Douglas, and H. A. West collected around Buffalo. Frank Bond contributed information and specimens from the Cheyenne area.

The Birds of Wyoming was issued in 1902. It marked Knight's first and only venture into the field of ornithology. The introduction to the book includes a resume of the literature, notes on studying birds, and a reprint of an article by Laurence Bruner, "Birds in their Relation to Agriculture." The main part of the book is an annotated list of 288 species or subspecies known to occur in Wyoming plus a list of 12 "hypothetical" species. Knight was conservative and did not include any species for which there was not a specimen or a reliable report in the literature. He did mistakenly credit Aiken's observations from Colorado to Wyoming (See Holden and Aiken (1872) under "Additional Collections and Observations: 1850-1880").

Since most of the men who contributed information to the book lived in southeast Wyoming, the notes with each species refer primarily to that part of the state. Information on other areas of the state is based mostly on the literature.



Most of the birds collected by Knight and Gilmore are now in the University of Wyoming Museum of Zoology at Laramie. Many of Gilmore's specimens are labelled simply C. W. G. A few specimens collected by Jesurun and West are also in the museum.

#### The Twentieth Century

##### The Biological Survey in Wyoming: 1910-1917

###### Entire State

Not until 1885 was there a federal organization concerned with birds alone. In that year the Division of Entomology of the Department of Agriculture established a section of Economic Ornithology. A year later it became the Division of Economic Ornithology and Mammalogy. In 1896 it was renamed the Division of Biological Survey, and in 1905 it was raised to the rank of a bureau.

The original purpose of this organization was to investigate the relationships between birds and agriculture, but by the end of the 19th century, the Survey had begun to publish studies on much broader aspects of biology.

In 1910 the Bureau of Biological Survey began a biological inventory of Wyoming (Henshaw 1911), ". . . with special reference to the life zones and crop areas and to the native mammals and birds and their economic relations." Field investigators in Wyoming were H. E. Anthony, Vernon Bailey, Merrit Cary, B. H. Dutcher, Stanley G. Jewett, J. Alden Loring, C. Hart Merriam, Edward A. Preble, D. D. Streeter, Jr., and Alexander Wetmore (Cary 1917). The first year field work was conducted in the Wind River and Big Horn basins (Henshaw 1911). The survey was continued in 1911 and up to June 30, 1912, when field work was sus-



pended because of insufficient funds (Henshaw 1913). The survey was resumed and completed in 1914 (Henshaw 1914).

Some idea of the scope of the survey can be gained from reading Vernon Bailey's directions to field assistants of the Biological Survey (Bailey 1912). In a new locality every mammal, bird, reptile and characteristic plant was to be recorded when seen, not at the end of the day. Reports made from memory were considered worthless. The field workers were instructed to collect a representative sample of the birds. Under each species in the bird report they were to record abundance, distribution, habitat, migration, nesting habits, food and other habits, especially those of economic importance.

In the final report (Cary 1917) each life zone is discussed, and the characteristic plants and animals of each zone are listed. Most of the bird specimens collected by the survey in Wyoming are now in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.

The Biological Survey eventually evolved into the present United States Fish and Wildlife Service in the Department of the Interior.

Major contributions to Wyoming ornithology: 1913-1940

In 1913 Benjamin H. Grave, a professor of zoology at the University of Wyoming, and Ernest P. Walker, a university student (Cattell and Cattell 1933), published a bulletin on the birds of Wyoming (Grave and Walker 1913). Their account was supplementary to Knight's (1902) publication. They added 45 more species to

the list of birds occurring in Wyoming and included local lists from about a dozen places in the state. Walker collected birds in the Laramie area in 1911 and 1912. These specimens are now in the Museum of Zoology at the University of Wyoming.

In 1925 Milton P. Skinner published a comprehensive treatment of the birds of Yellowstone National Park (Skinner 1925). Skinner lived and worked in the park for many years, and this publication was based on his extensive personal knowledge of the birds of the area. He had served as the official Yellowstone Park Naturalist, the first naturalist to be appointed in the National Park Service. His treatment includes a list of 202 species occurring in the park and separate chapters on the White Pelican, Mallard, and Trumpeter Swan.

Arthur B. Fuller and B. P. Bole, Jr. collected birds on three separate trips to Wyoming: September 22-December 14, 1914; August 28-November 16, 1923; and July 17-August 7, 1927 (Fuller and Bole 1930). They collected 172 specimens, mostly in the southern and western parts of the state. These were identified by H. C. Oberholser and deposited in the Cleveland Museum of Natural History. Their report includes an annotated list of 122 species seen or collected in Wyoming.

The last extensive treatment of the birds of Wyoming was written by Otto McCreary (1937, revised 1939), a research chemist with the University of Wyoming Agricultural Experiment Station from 1926 to 1944 (Palmer 1947). McCreary listed 332 species for the state. He was especially interested in bird migration, and in many of the

species accounts he gives the dates of earliest and latest appearance in southeast Wyoming.

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## APPENDIX

Birds originally described from Wyoming as recognized in the American Ornithologists' Union Checklist (1957) and supplements.

Mountain Plover, Eupoda montana, originally named Charadrius montanus. Type: Tableland of the Rocky Mountains = near Sweetwater River, J. K. Townsend in 1834. Townsend, J. K. 1837. J. Acad. Nat. Sci. Phila. 7(2): 192.

Sage Thrasher, Oreoscoptes montanus, originally named Orpheus montanus. Type: Plains of the Rocky Mountains = Sandy Creek, lat 42° N, long 109° 30' W, J. K. Townsend in 1834. Townsend, J. K. 1837. J. Acad. Nat. Sci. Phila. 7(2): 192.

Northern Three-toed Woodpecker subspecies, Picoides tridactylus dorsalis, originally named Picoides dorsalis. Type: Laramie Peak, F. V. Hayden in 1857. Baird, S. F. in S. F. Baird et al. 1858. Rep. Expl. Surv. Pacific Railroad Vol. 9, pp. xxviii, 97, 100.

American Robin subspecies, Turdus migratorius propinquus, originally named Turdus propinquus. Type: Western region including eastern base of Rocky Mountains = Laramie Peak. Ridgway, R. 1877. Bull. Nuttall Ornith. Club 2(1): 9.

Hermit Thrush subspecies, Hylocichla guttata auduboni, originally named Turdus auduboni. Type: Fort Bridger, C. Drexler in 1858. Baird, S. F. 1864. Smiths. Misc. Coll. No. 181: 16.

Yellow Warbler subspecies, Dendroica petechia morcomi, originally named Dendroica aestiva morcomi. Type: Fort Bridger, Utah = Wyoming, C. Drexler in 1858. Coale, H. K. 1887. Bull. Ridgway Ornith. Club 2: 82.

Song Sparrow subspecies, Melospiza melodia montana, originally named Melospiza fasciata montana. Type: Fort Bridger, Utah = Wyoming. Henshaw, H. W. 1884. Auk 1(3): 224.

Northern Waterthrush subspecies, Seiurus noveboracensis notabilis, originally named Seiurus naevius notabilis. Type: Black Hills = shores of Como Lake, Albany County, Wyoming. Ridgway, R. 1880. Proc. U. S. Nat. Mus. 3: 12.

TABLE I

DENSITIES OF BIRDS BY BLM  
VEGETATION TYPE

(All densities are animals/acre, unless otherwise indicated. Density variation occurs because of variations among references.)

Species	011	021	022	041	042	043	044	045	05	059
<u>Game Birds</u>										
Canada Goose										
Pintail										
Mallard										
Gadwall										
Cinnamon Teal										
Redhead										
Ruddy Duck										
Blue-winged Teal										
Turkey										
Blue Grouse										
Ruffed Grouse										
Sharp-tailed Grouse				.01-.06			.01-.06		.01-.06	.01-.06
Sage Grouse				.05-.08	.05-.08	.05-.08	.05-.08			
White-tailed Ptarmigan		.02-.03							.02-.03	
Chukar				.04-0.1	.04-0.1	.04-0.1		.04-0.1		

Species	011	021	022	041	042	043	044	045	05	059
Gray Partridge	.02-0.1	.02-0.1	.02-0.1							
Virginia Rail										
American Coot										
Common Snipe									0.1	
Mourning Dove				0.1				0.5		0.1
<u>Predaceous Birds</u>				0.5						
Black-billed Magpie										
Starling										
<u>Protected Birds</u>										
Western Grebe										
Pied-billed Grebe										
Turkey Vulture										
Goshawk*										
Cooper's Hawk										
Marsh Hawk*									19	
Rough-legged Hawk*									14	
Ferruginous Hawk*									20- 30	
									37	

Species	011	021	022	041	042	043	044	045	05	059
Swainson's Hawk*	0.6-0.8									
	45									
	2.6									
Golden eagle*	50-100									9- 46
	12									
Prairie Falcon*	56									
Merlin										
American Kestrel*	52									
Great Blue Heron										
Mountain Plover	.05									
	0.6									
	.02-0.2									
Great Horned Owl*	32									
Saw-whet Owl										
Common Nighthawk										

Species	011	021	022	041	042	043	044	045	05	059
Broad-tailed Hummingbird									0.5	
Calliope Hummingbird									0.4	
Common Flicker										
Hairy Woodpecker										
Downy Woodpecker										
Black-backed Three-toed Woodpecker										
Northern Three-toed Woodpecker										
Yellow-bellied Sapsucker									0.7	
Williamson's Sapsucker										
Eastern Kingbird								0.1		
Western Kingbird										
Willow Flycatcher									0.1	
									0.5	



Species	011	021	022	041	042	043	044	045	05	059
Western Flycatcher										
Olive-sided Flycatcher										
Western Wood Pewee									.03	0.1
Horned Lark	0.2	.04	0.2	0.2			0.3			
	0.3-1.1									
	0.5									
Violet-green Swallow										
Tree Swallow										
Common Raven										
Steller's Jay										
Scrub Jay										
Pinyon Jay										
Gray Jay										
Clark's Nutcracker										

Species	011	021	022	041	042	043	044	045	05	059
Black-capped Chickadee										
Mountain Chickadee										
White-breasted Nuthatch										
Red-breasted Nuthatch										
Pygmy Nuthatch										
Brown Creeper										
House Wren										0.1
Rock Wren	0.1									
Catbird										
Brown Thrasher							0.2			
Sage Thrasher				.02						
				0.1						
American Robin			.02						0.2	
Swainson's Thrush									.07	
									0.5	

Species	011	021	022	041	042	043	044	045	05	059
Townsend's Solitaire										
Hermit Thrush										
Western Bluebird										2.1
Mountain Bluebird										
Ruby-crowned Kinglet										
Golden-crowned Kinglet										
Water Pipit		0.2								
Sprague's Pipit							0.1			
Cedar Waxwing										
Loggerhead Shrike							0.2			
Solitary Vireo										
Red-eyed Vireo										
Warbling Vireo									0.6	
Yellow Warbler									1.0	

Species	011	021	022	041	042	043	044	045	05	059
Yellow-rumped Warbler										
Yellowthroat							0.3		.05	
									.05	
Yellow-breasted Chat										
MacGillivray's Warbler									0.9	
									0.1	
American Redstart										
Western Meadowlark	.04			0.4			0.2			
	0.1			0.2						
	0.3									
Yellow-headed Blackbird										
Red-winged Blackbird										
Brown-headed Cowbird							0.2			
Northern Oriole										
Western Tanager										

Species	011	021	022	041	042	043	044	045	05	059
Black-headed Grosbeak									0.5	
									.02	
Pine Grosbeak										
Cassin's Finch										
Pine Siskin										
American Goldfinch										
Lesser Goldfinch										
Red Crossbill										
Green-tailed Towhee										
Rufous-sided Towhee										
Savannah Sparrow				0.1						
Grasshopper Sparrow								.02		
								0.2		
Lark Bunting	0.2			0.3				0.5		
	1.4-4.3									

Species	011	021	022	041	042	043	044	045	05	059
Vesper Sparrow	0.2		0.1	0.1			0.4			
				0.6			0.2			
				0.5						
Lark Sparrow				0.5						
				0.1						
Gray-headed Junco										
Dark-eyed Junco									0.4	
Lazuli Bunting									0.5	
Chipping Sparrow									0.3	
Brewer's Sparrow	0.1			0.5-0.6			0.3			
				1.1-0.1						
White-crowned Sparrow		0.1	.02						0.4	
									0.2	
Fox Sparrow									0.2	
Lincoln's Sparrow									0.5	
									0.7	

Species	011	021	022	041	042	043	044	045	05	059
Song Sparrow									0.3	
McCown's Longspur	0.4									
	0.2									
	1.0									
Chestnut-collared Longspur	0.3						0.2			
<u>All Birds</u>	0.7		1.0	3.1			2.0			2.7
	0.9			1.8						
	1.0			1.4						
	0.1			0.8						
	2.3									
	1.0-1.3									
	1.1									
<u>All Birds (winter)</u>	.02									

\* Miles per bird

TABLE I (Continued)

DENSITIES OF BIRDS BY BLM  
VEGETATION TYPE

Species	06	063	092	101	104	141	151	164	191	Marsh
<u>Game Birds</u>										
Canada Goose										0.6
Pintail										0.3
Mallard										8.0
Gadwall										0.2
Cinnamon Teal										5.4
Redhead										8.9
Ruddy Duck										0.9
Blue-winged Teal										0.5
Turkey	.03									
Blue Grouse	0.1-0.7									
Ruffed Grouse	.02-0.2			.02-0.2	.02-0.2					



Species	06	063	092	101	104	141	151	164	191	Marsh
Sharp-tailed Grouse										
Sage Grouse										
White-tailed Ptarmigan					.0					
Chukar			.04-0.1			.04-0.1		.04-0.1		
Gray Partridge									.02-0.1	
Virginia Rail				0.2						
American Coot										1.4
Common Snipe				0.1	0.1					
Mourning Dove	.01		1.0	0.7						
	0.1			.04						
	1.2			0.3						
	1.0									
<u>Predaceous Birds</u>										
Black-billed Magpie	.04			0.1						

Species	06	063	092	101	104	141	151	164	191	Marsh
Starling				0.4						
				.04						
				0.3						
				0.4						
<u>Protected Birds</u>										
Western Grebe										.02
Pied-billed Grebe										.06
Turkey Vulture	.02			.02	.02					
Goshawk*				5.1						
Cooper's Hawk	.02			.02	.02					
Marsh Hawk*										.04/ac.
Rough-legged Hawk*										
Ferruginous Hawk*								13-17.7		
								7.2		
Swainson's Hawk*				2.6						
Golden Eagle										

Species	06	063	092	101	104	141	151	164	191	Marsh
Prairie Falcon*				0.7-1.3	0.7-1.3					
Merlin				64						
American Kestrel*					0.1/ac					
					0.2/ac					
Great Blue Heron				0.8						1.2
Mountain Plover										
Great Horned Owl*				6.4				2.5		
Saw-whet Owl	0.1		0.1							
Common Nighthawk	.01-.04	.05								
Broad-tailed Hummingbird	.09			.09	.09					
	.05			0.1	0.5					
	.02-.01									
Calliope Hummingbird	0.1				0.4					
Common Flicker	.04			.07	.07					
	.07			0.1						
	0.5			0.3						

Species	06	063	092	101	104	141	151	164	191	Marsh
Hairy Woodpecker	.07	.02		.03	.03					
	.03									
	.01-.08									
Downy Woodpecker	.01			0.3	.01					
				0.7						
				.01						
Black-backed Three-toed Woodpecker			.01							
Northern Three-toed Woodpecker	.01									
Yellow-bellied Sapsucker				0.5	.07					
Williamson's Sapsucker	.05			.05	.05					
Eastern Kingbird				0.2						
				0.3						
Western Kingbird	0.1		0.1	0.3						
Willow Flycatcher				0.4	0.1					
					0.5					

Species	06	063	092	101	104	141	151	164	191	Marsh
Western Flycatcher	0.2			.02	.02					
	.02									
Olive-sided Flycatcher	.01									
Western Wood Pewee	1.5-.02			.02	.02					
	0.1			1.7	.03					
	0.2									
Horned Lark									0.8	
Violet-green Swallow	.03			.03	.03					
Tree Swallow	.01	.01		4.7						
Common Raven			.08							
Steller's Jay	0.2			0.2	0.2					
Scrub Jay			0.3							
Pinyon Jay										
Gray Jay	.01	.04								
	.03	.03								

Species	06	063	092	101	104	141	151	164	191	Marsh
Clark's Nutcracker	0.2	0.2								
Black-capped Chickadee			0.2	0.3						
Mountain Chickadee	0.7	.09	0.2	0.2	0.2					
	0.2	.07								
	0.1									
White-breasted Nuthatch	.04									
	0.1									
Red-breasted Nuthatch	.04			.02	.02					
	.02									
Pygmy Nuthatch	.02			.01	.01					
	0.2									
	.01									
Brown Creeper	.04			.02	.02					
	0.1									
	.02									
House Wren	0.1		0.1	.02	.02					
	.02			0.2						
				2.2						

Species	06	063	092	101	104	141	151	164	191	Marsh
Rock Wren	0.1		0.1							
Catbird				0.3						
Brown Thrasher	0.2		0.2							
Sage Thrasher										
American Robin	.01		0.3	.01	0.2					
	.02			1.1	.01					
	0.8			0.1						
	.08-0.3									
	.07-0.4									
Swainson's Thrush	.06			0.3	.07					
					0.5					
Townsend's Solitaire	.01	.01	0.2	.09	.09					
	.09									
Hermit Thrush	0.2	0.1								
	.08	.01								
	.09-.04									

Species	06	063	092	101	104	141	151	164	191	Marsh
Western Bluebird	2.1			.01	.01					
	.01									
Mountain Bluebird	.09-0.9			0.3						
Ruby-crowned Kinglet	0.2			.03	.03					
	.06									
	0.3									
Golden-crowned Kinglet	0.1									
Water Pipit										
Sprague's Pipit										
Cedar Waxwing				0.3						
Loggerhead Shrike	0.1		0.1							
Solitary Vireo	0.3									
Red-eyed Vireo				0.4	.07					
				0.7						
Warbling Vireo	.07			0.1	0.6					
				0.3						
				.07						



Species	06	063	092	101	104	141	151	164	191	Marsh
Yellow Warbler	1.3			1.9	1.0					
				0.1						
				1.0						
Yellow-rumped Warbler	0.4	.07		.06	.06					
	.06-.02	.02								
	.05									
Yellowthroat				.06	.05					
				0.3	0.5					
Yellow-breasted Chat				0.2						
MacGillivray's Warbler	.06			.06	.06					
				.03	0.9					
					0.1					
American Redstart				0.4						
				0.5						
Western Meadowlark	0.3		0.3	0.1		0.5				
Yellow-headed Blackbird				.06						

Species	06	063	092	101	104	141	151	164	191	Marsh
Red-winged Blackbird				0.1						
Brown-headed Cowbird										
Northern Oriole				0.6						
				0.1						
Western Tanager	.01	.05		.01	.01					
	0.1									
	0.2									
Black-headed Grosbeak				0.2	0.5					
					.02					
Pine Grosbeak	.04									
Cassin's Finch	.05-.06									
	.03									
Pine Siskin	.06-.08	.02	.08							
	.09	0.2								
	0.1									
	0.6									
	0.3									

Species	06	063	092	101	104	141	151	164	191	Marsh
American Goldfinch				.07						
Lesser Goldfinch	.02			0.1						
				0.3						
				0.2						
Red Crossbill	0.2	.04								
	.04									
Green-tailed Towhee	.06			.06	.06					
Rufous-sided Towhee	0.2		0.2	0.1						
Savannah Sparrow				0.3						
Grasshopper Sparrow				0.1						
Lark Bunting						0.1				
Vesper Sparrow										
Lark Sparrow	0.4		0.4			0.6				
Gray-headed Junco	1.2	0.9	.08							
	0.2	.05								
	0.4									

Species	06	063	092	101	104	141	151	164	191	Marsh
Dark-eyed Junco	0.9- 1	0.1	0.6	.07	0.4				0.4-0.8	
Lazuli Bunting					0.5					
Chipping Sparrow	.03	.01	0.3	0.1	0.3					
	.06	.02								
	.07									
	.3									
	0.3									
Brewer's Sparrow						0.1				
White-crowned Sparrow				0.4	0.4					
					0.2					
Fox Sparrow	.08				0.2					
	.02									
Lincoln's Sparrow	.01			.01	.01					
				0.5	0.5					
					0.7					
Song Sparrow				.07	0.3					
				0.1						

Species	06	063	092	101	104	141	151	164	191	Marsh
McCown's Longspur									0.1	
Chestnut-collared Longspur										
<u>All Birds</u>	1.5	3.5	1.8	0.7		1.3			0.9	
	2.7	0.2	0.1	13.8					0.1	
	6.0-7.7	0.6	1.9	1.0						
	0.2	0.6	2.9	0.4						
	0.4			1.9						
	0.9			7.8						
	1.0									
	1.9									
	2.9									
	0.9									
	2.5									
<u>All Birds (winter)</u>	0.3	0.3	0.3	0.7					0.3	1
	0.4									

\*Miles per bird

Vegetation type designations used by the B.L.M. are as follows:

Type 01 Grass

- 011 Shortgrass
- 012 Mid-grass (bunch)
- 013 Mid-grass (sod)
- 021 Wet meadow
- 022 Dry meadow

Type 03 Forbs

- 031 Forbs (perennial)

Type 04 Sagebrush

- 041 Big sagebrush
- 042 Low sagebrush
- 043 Black sagebrush
- 044 Silver sagebrush
- 045 Rabbitbrush

Type 05 Mountain shrub

- 056 Serviceberry
- 057 Bitterbrush
- 059 Mountain mahogany

Type 06 Conifer

- 063 Lodgepole pine

Type 07 Waste

- 071 Brush

Type 08 Barren

- 081 Dry lake bed
- 083 Sand dune
- 087 Other

Type 09 Juniper

- 092 Juniper

Type 10 Broadleaf trees

- 101 Aspen-cottonwood
- 104 Other broadleaf trees

## Type 13 Saltbush

- 131 Shadscale
- 132 Nuttall saltbush
- 133 Mat saltbush

## Type 14 Greasewood

- 141 Black greasewood

## Type 15 Halfshrub

- 151 Winterfat
- 154 Other halfshrub

## Type 16 Desert shrub

- 164 Other desert shrub

## Type 18 Annuals

## Type 19 Cropland

- 191 Cropland

## BIRDS

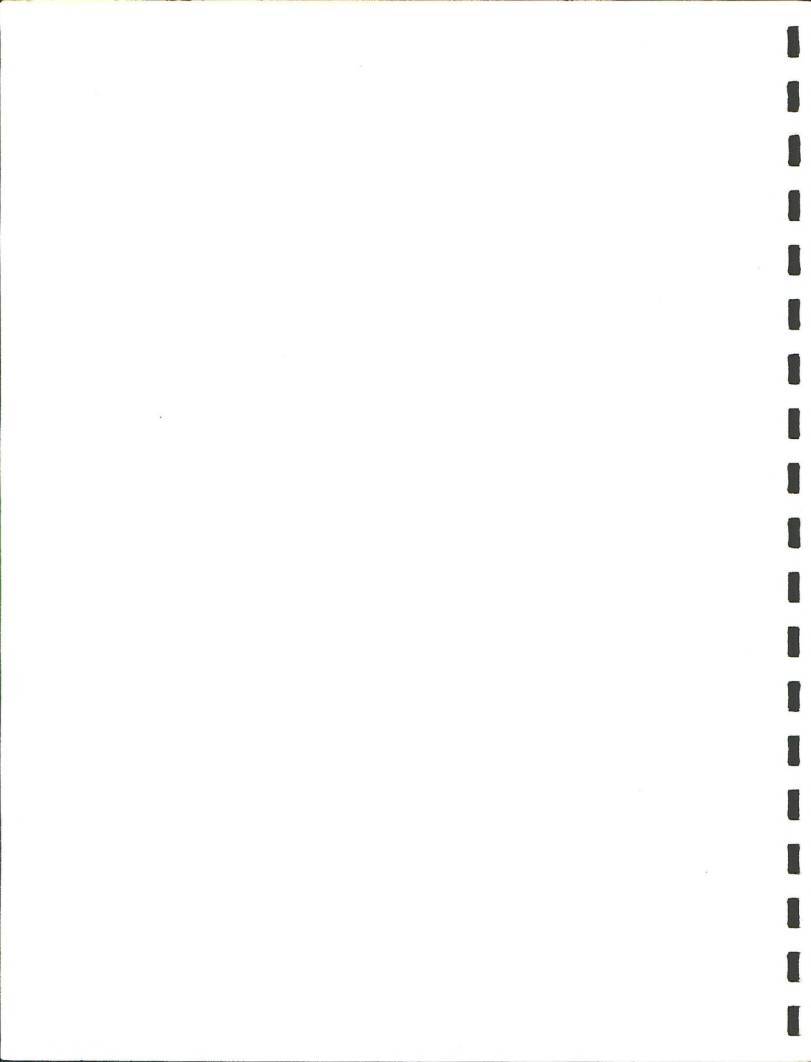
	Turnover Rate	Beginning with 100 Individuals Net No. Produced at Intervals of:*				No. Produced per Individual in the Population after: <sup>a</sup>			
		10 yrs.	20 yrs.	30 yrs.	40 yrs.	10 yrs.	20 yrs.	30 yrs.	40 yrs.
Canada goose	15 yrs.	67	133	200	267	0.7	1.3	2	2.7
Dabbling ducks	10 yrs.	100	200	300	400	1	2	3	4
Diving ducks	10 yrs.	100	200	300	400	1	2	3	4
Turkey	5-10 yrs.	100-200	200-400	300-600	400-800	1-2	2-4	4-6	6-8
Grouse	6-12 yrs.	83-167	167-333	250-500	333-667	0.83-1.67	1.67-3.33	2.5-5.0	3.3-6.7
Partridge	4 yrs.	250	500	750	1000	2.5	5.0	7.5	10.0
Rails	5 yrs.	200	400	600	800	2	4	6	8
American coot	10 yrs.	100	200	300	400	1	2	3	4
Common snipe	8 yrs.	125	250	375	500	1.3	2.5	3.8	5.0
Mourning dove	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Magpie	12 yrs.	83.3	167	250	333	0.8	1.7	2.5	3.3
Starling	10 yrs.	100	200	300	400	1	2	3	4
Grebes	10 yrs.	100	200	300	400	1	2	3	4
Turkey vulture	8 yrs.	125	250	375	500	1.3	2.5	3.8	5.0
Accipiters	12 yrs.	83.3	167	250	333	0.8	1.7	2.5	3.3
Buteo	12 yrs.	83.3	167	250	333	0.8	1.7	2.5	3.3
Eagles	15 yrs.	67	133	200	267	0.7	1.3	2	2.7
Falcons	12 yrs.	83.3	167	250	333	0.8	1.7	2.5	3.3
Mountain plover	8 yrs.	125	250	375	500	1.3	2.5	3.8	5.0
Owls	10 yrs.	100	200	300	400	1	2	3	4
Common nighthawk	8 yrs.	125	250	375	500	1.3	2.5	3.8	5.0
Hummingbirds	4 yrs.	250	500	750	1000	2.5	5.0	7.5	10.0
Woodpeckers	10 yrs.	100	200	300	400	1	2	3	4
Kingbirds	5 yrs.	200	400	600	800	2	4	6	8
Flycatchers	5 yrs.	200	400	600	800	2	4	6	8
Horned lark	5 yrs.	200	400	600	800	2	4	6	8
Swallows	12 yrs.	83.3	167	250	333	0.8	1.7	2.5	3.3
Common raven	12 yrs.	83.3	167	250	333	0.8	1.7	2.5	3.3
Jays	10 yrs.	100	200	300	400	1	2	3	4
Chickadees	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Nuthatches	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Wrens	4 yrs.	250	500	750	1000	2.5	5.0	7.5	10.0



	Turnover Rate	Beginning with 100 Individuals Net No. Produced at Intervals of:*				No. Produced per Individual in the Population after: <sup>a</sup>			
		10 yrs.	20 yrs.	30 yrs.	40 yrs.	10 yrs.	20 yrs.	30 yrs.	40 yrs.
Catbird	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Thrashers	10 yrs.	100	200	300	400	1	2	3	4
Thrushes	8 yrs.	125	250	375	500	1.3	2.5	3.8	5.0
Bluebirds	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Kinglets	5 yrs.	200	400	600	800	2	4	6	8
Pipits	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Waxwings	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Loggerhead shrike	8 yrs.	125	250	375	500	1.3	2.5	3.8	5.0
Vireos	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Warblers	5 yrs.	200	400	600	800	2	4	6	8
Western meadowlark	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Blackbirds	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Northern oriole	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Western tanager	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Grosbeaks	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Finches	6 yrs.	167	333	500	667	1.7	3.3	5.0	6.7
Pine siskin	5 yrs.	200	400	600	800	2	4	6	8
Goldfinches	5 yrs.	200	400	600	800	2	4	6	8
Red crossbill	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Towhees	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Sparrows	7 yrs.	143	286	429	571	1.4	2.9	4.3	5.7
Longspurs	5 yrs.	200	400	600	800	2	4	6	8

\* Assuming that habitat is at carrying capacity and that any animals produced over the carrying capacity are lost from the habitat due to some form of natural mortality.

a To determine the number of animals lost per acre after 10, 20, 30, or 40 years, simply multiply the density figure from Table I by the number produced per individual after 10, 20, 30, or 40 years.



Bureau of Land Management  
Library  
Denver Service Center

Borrower's Name	Date Loaned	Date Returned
OL 684 .W8 D67 Dorn, Jane Logan. Wyoming ornithology		

